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W. H. H. H. H. H.

COUNTRY  
SCHOOL-HOUSES:

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CONTAINING  
ELEVATIONS, PLANS, AND SPECIFICATIONS,  
WITH  
ESTIMATES, DIRECTIONS TO BUILDERS,  
SUGGESTIONS AS TO SCHOOL GROUNDS,  
Furniture, Apparatus, etc.,  
AND A  
TREATISE ON SCHOOL-HOUSE ARCHITECTURE.

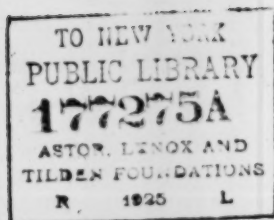
BY  
JAMES JOHONNOT, 1823-1888.  
WITH NUMEROUS DESIGNS BY S. E. HEWES.

NEW YORK:  
IVISON AND PHINNEY,  
821 BROADWAY.

CHICAGO: S. C. GRIGGS & CO.  
1859.

E.S.

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## PREFACE.

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For the past few years Architectural Science has made rapid and decided progress in this country, and, in nearly every description of building, improvements have been made, both in regard to external appearance and internal arrangement. Evidences of this progress may be seen in the superior elegance of the modern public edifices and private residences in our cities and villages, and in the greater comfort and convenience of the later farm-houses in the country. The increase of architectural knowledge has correspondingly developed the taste of the country, which, in its turn, demands a greater amount of knowledge, and thus one step of improvement leads to others still farther in advance.

Of all buildings, however, the last to feel this progressive impulse were school-houses, the most important of them all. In cities and large villages, where the necessity exists of erecting large and costly buildings, it is true that public attention has been turned in this direction, and there has been developed a distinctive school architecture which applies the principles of science to the wants and necessities of the school-room; but in country places generally, little attention has been given to the matter, and the principles developed in the city architecture are not applicable to the wants of the smaller district schools.

There has been, however, a manifest improvement in many sections of the country since the condition of school-houses was so thoroughly exposed by the Hon. Horace Mann, in one of his earlier reports to the Massachusetts Board of Education. The first impulse of this movement was given by Mr. Mann, and the superintendents of schools in various parts of the country who followed his lead; but its extent and success are mainly attributable to the timely and valuable work of Mr. Henry Barnard upon "School-House Architecture." In this work were given models of the best school-houses in the country, reports of superintendents and school-officers, and a great amount of other matter of great value to the schools. It was almost a complete epitome of all that was known concerning school-houses at the time of its publication.

But with this great mass of information collected, there has been little or no effort made to reduce it to system, and to develop from it principles of universal application, or to apply architectural science to the construction of country school-houses. In most cases the directions given for building have not been sufficiently specific for general use, and hence improved plans have not been adopted as extensively as they would have been under other circumstances.

The present work is designed in some measure so supply this deficiency. It contains plans specially adapted to the wants of the country districts, with all the details of building, estimates, bills of materials and labor, specifications, and full and accurate descriptions, so that any ordinary builder can construct a school-house precisely as described. A few plans of a more elaborate character have also been added.

The plans and all the details pertaining to the comfort and convenience of the school-room have been prepared with great care and attention, and in accordance with principles derived from extended observation and years of practical teaching.

The architectural portion of the work has been under the charge of Mr. S. E. Hewes, a gentleman who has a large experience in that department of labor. He has endeavored to embody in architectural forms the principles of construction best adapted to the present condition of our schools. The public will determine the measure of success which has attended these efforts.

With the earnest hope that it may contribute to the improvement of our common schools, this work is respectfully submitted to all who are interested in the cause of education.

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## PART I.

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### THE USES OF BUILDING AND ARCHITECTURE.

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#### CHAPTER I.

##### GENERAL PRINCIPLES OF BUILDING.

THE terms Building and Architecture though often used to express the same idea, are in meaning essentially different. Building has reference to use, while Architecture aims to produce beauty. The object of Building is accomplished when the ends of usefulness are attained; but Architecture is not satisfied until it has created in the mind emotions of pleasure. The construction of walls, roofs, windows, and all the necessary parts of an edifice, is the business of the builder; the office of the architect is to dispose and arrange these parts in the most harmonious and attractive manner.

The two most obvious uses, in all buildings designed for the occupation of man, are shelter and warmth. These

conditions are found, by savage or barbarous nations, in natural or artificial caverns, in hollows of trees, and in rude huts of mud or clay. At the very dawn of civilization the art of building began to receive attention. Rude at first, it gradually improved as the wants of man were developed, until it has reached a state of comparative perfection. In every stage of its progress, however, shelter and warmth have been the principal ends to be attained. We might class with these another scarcely less important, viz., durability. Hence the strength and stability of walls, the tightness of roof and outside covering, are matters of prime interest; and if neglected in the outset, no subsequent expenditure of skill or labor can provide a remedy.

To secure these results, attention should be specially paid to two things.

1. The *materials* used should be excellent in *quality*.

It is a false economy that consents, under any circumstances, to use inferior materials. There may be, in the beginning, a small saving of cost, but the result will be premature decay, and consequent expense for rebuilding. The greatest care should be taken to procure bricks properly burned, straight-grained timber for frames, sound roof-boards and siding, floor-boards without knots, shingles of the first quality, and fresh-burned lime. These precautions can not be too strongly urged. A single stick of bad timber will sometimes ruin a whole building; and many a brick wall has fallen in consequence of using lime which has been too long exposed to the action of the air. The money annually expended in repairs occasioned by

the use of poor materials, is more than triple that increase of the first cost, which would have entirely obviated the difficulty. *Every part of the materials should be carefully examined by competent judges, and all, except the very best, rejected.*

2. The work should be well done.

Job-work, as it is usually termed (often another name for work miserably performed), can not be too earnestly deprecated. With the best of materials a careless or unskillful workman will construct a worthless building. Lumber of the best kind may be worse than wasted by a slovenly manner of framing and adjusting it. Shingles poorly laid will be followed by leaks, which must seriously damage the plaster and inside finish. Foundations insecurely built will rack and destroy every other part of the building. Window-frames imperfectly constructed, siding and floors loosely laid, and doors with yawning joints, all allow the entrance of the cold and storms, and thus become the source of unnecessary expenditure for fuel, as well as of serious injury to the entire structure. Lath and plaster badly put on, last but a short time, and constant patching presents an unsightly appearance, besides being a cause of annoyance and expense. Surely no further specification is needed to satisfy the most reluctant, that the truest economy demands such an expenditure for labor in the outset as shall secure the best possible construction. Faults in workmanship should be carefully provided against, and every part of the work should be subjected to the closest scrutiny. But workmen are not alone to blame for improper construction. It is

quite as often the result of false economy or parsimony on the part of owners. The estimates of mechanics are often cut down without an intelligent reason, upon the assumption that they are not made in good faith. In consequence, the workmen, who perhaps are forced by circumstances to undertake the job, are obliged to slight their work to save themselves from absolute loss. The injury resulting does not end with the work imperfectly done, but it has a direct tendency to impair that confidence in man which is the basis of all true humanity, and to lead to a regular system of deceptions on the part of both employer and workmen. Let those having charge of the construction of buildings therefore beware of offering a premium for *poor* work by paying less than *good* work is worth. Let them remember that "the laborer is worthy of his hire," and that to extort labor for less than its value is only a safe and legal species of robbery.

## CHAPTER II.

### ARCHITECTURE AN EDUCATIONAL INFLUENCE.

ORDINARY use is not the only value of buildings. They may be so constructed as to appeal to the higher sentiments, and render important aid in developing the better and finer feelings of our nature. This is the proper province of Architecture, and the work of the architect is to so fashion our buildings and arrange their details, that while they answer the purposes of their erection, they may, at the same time, satisfy that love of the beautiful, the symmetrical, and the harmonious, which is innate in the human heart. The faculty of the mind which conceives this sentiment is what we call *taste*, and it is one which needs constant and systematic cultivation.

In this country but little attention has yet been given to those things which elevate and refine. The entire energies of our people were early and exclusively devoted to the rude task of subduing the wilderness and providing the necessities of life. They could bestow no time on pursuits which did not directly conduce to the simplest ends of human existence. Consequently, their descendants are a prompt, resolute, and vigorous race,

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with more determination to do, and more energy in doing, than any the world has ever seen before. But the arts of refinement which were, at first, through absolute necessity, neglected, are now habitually despised or disregarded. No people on earth who have attained to an equal degree of intellectual and moral culture, evince so little taste and refinement as ourselves.

We begin, however, to discern the dawning of a better day. We begin to feel that there are wants in our nature that are not to be satisfied by mere material appliances. We begin to appreciate the beautiful, and its influence in developing our higher powers. Evidences of this change of public sentiment may be found in the attention now paid to art; in the patronage beginning to be bestowed upon artists; and in the improvement of the architecture of public buildings and private residences in many parts of the country. The results of this improved sentiment re-act upon the community, softening down the sharp features of our national character, multiplying those little amenities which give grace, beauty, and dignity to our life, and even aiding to develop the Christian virtues of faith and charity.

Numerous and potent are the influences furnished by literature for the cultivation of the taste; but impressions more vivid and lasting may be made by the presentation to the senses of sublime or beautiful objects, such as natural scenery, landscape improved by art, and the best productions of sculpture, painting, and architecture.

Of the various influences which tend to mature and refine the taste, we have occasion, in this work, to refer



only to those of Architecture. The importance and necessity of this art, to the great work of education, we shall endeavor to show.

Architecture, primarily, deals only with forms which address the eye. It embodies ideas of proportion, symmetry, variety, harmony, and unity.

By PROPORTION is meant that due relation which should exist between the different dimensions of a building, in order to convey the idea of correctness. We frequently see buildings in which this principle is violated, and are pained at the want of taste so prominently displayed. Buildings too long for their height, too high for their length, or too wide for either, appear to be the "rule," rather than the "exception;" yet a well-proportioned structure is immediately and almost universally recognized as such, and cannot fail to afford general satisfaction and delight.

SYMMETRY requires a proper balance of parts. The regular placing of doors and windows, and the disposal of all the details, so that none shall seem out of place, are in obedience to this principle.

VARIETY is the opposite of monotony, and would induce us to relieve in some manner blank walls, and to break up long horizontal lines, so as to produce an agreeable effect, like that made by a diversified landscape, or a number of views in nature, each differing from the other. This would lead us also to obviate sameness in a range of buildings, and, within certain limits, to give diversity to details. It would forbid the erection of those vast square or oblong piles of brick and mortar, which

now so frequently burden, without adorning, the face of the earth.

HARMONY may be defined as the limit of variety. It is that peculiar relation which all the parts should have to each other, producing in the mind a sense of completeness and adaptation. It allows no incongruities, and indulges in no conceits. Harmony in architecture, as in music, so arranges and blends the different parts, that each seems an indispensable element of a perfect whole.

UNITY refers to the evident design which pervades the structure; the one idea, which has not only harmonized the parts with each other, but adapted the whole to its uses. In accordance with this principle, while all the other laws of taste in architecture should be observed, they should be subordinated to the object of the construction.

As the mind becomes familiar with beautiful objects, and with the laws of beauty, its sensibility to moral excellence is cultivated, the manners are conformed to the principles of harmony, and the effects produced upon the whole man are of the most beneficial and lasting character. The influence ascribed by Plato, in his *Republic*, to a musical education, may be predicated with equal truth of a judicious culture in this department of art. It is essential, he says, "because it makes rhythm and harmony to settle deeply in the inner soul, and take strong hold of it, carrying with them comeliness, and making a man comely-minded. Also, because one so matured will have the quickest perception of all faults and imperfections in art or nature, and, regarding them



with just aversion, will admire and love the beautiful. This he will receive with joy into his soul, will feed on it, and assimilate his own nature to its beauty, will learn to censure and hate deformity, *even in early youth, while yet incapable of understanding the reason why*, and when the reason comes will embrace it gladly, as a familiar thing."

In those countries where architecture has reached its highest development, taste and refinement exert their greatest influence. As an instance of the refining effect of beautiful objects, the fact might be mentioned that, in many of the old countries, sculptured decorations in architecture have remained for ages uninjured, save by the action of the elements; and that even after the edifices they once adorned have fallen into ruin, a feeling of veneration in the hearts of the people seems to have shielded these trophies of art from profanation. In our more logical and practical communities, the destructive passion would be restrained by no such sentiment; and not twenty-four hours would elapse after an old building of celebrity had been abandoned, before fragments would be chipped off for mementoes, or pounded to pieces, to satisfy the analytical spirit of some ruthless traveler. Beauty of form, however, seems, in some measure, to afford protection. An old or mean-looking building, deserted or unoccupied, is a target for boys, and even for children of a larger growth; and every one feels an instinctive desire to rid the earth of such deformity. But a complete and beautiful structure generally enjoys a longer, if not an entire, exemption from injury. When

taste is really and universally cultivated, there will be no danger of the wanton desecration of beautiful objects.

Little or no attention has ever been paid to the element of beauty in the school-house architecture of this country, as the poor apologies for school-houses, so common throughout the older States, painfully show. They seem to have been erected simply for shelter, and with the smallest possible cost at the outset; to call it cheapness or economy would be a misnomer. They stand as vile offenses against good taste, and ugly excrescences upon the landscape. They make no appeal to the higher sentiments, and consequently no effort can preserve the building or fixtures from disfigurement and ruin. Every teacher knows the difficulty of protecting a school-house from the ubiquitous and all-devouring Yankee jack-knife! The result is, that the building, unsightly when new, becomes more so through the rudeness which its very appearance stimulates. The busy fingers of time may soften its outlines, and spread over its surface sober tints of brown; but the innate ugliness of the structure defies all efforts to make it other than a monstrosity.

In the erection of every school-house particular care should be taken to observe the rules of taste as regards form. In our country districts, where a small and plain building only is demanded, we need to consider proportion and symmetry alone; the other principles of architecture applying chiefly to larger and more pretending structures. If this is done, if our school-houses all conform to these two fundamental laws, they can not fail of

becoming strong educational influences in the right direction. The advantages, in this regard, of obeying the principles of architecture in the construction of school-houses may be summed up in a few words.

1. If the building is an object of beauty, the very sight of it inspires emotions of pleasure.

2. It adorns and beautifies the landscape of which it forms a part.

3. It becomes an attractive place to children, and does not repel them, as now, by its deformity.

4. It practically teaches ideas of proportion and symmetry, and new and exalted conceptions of beauty of form.

5. It throws over property the shield of beauty, and so checks, and finally eradicates the rudeness which is stimulated to destructiveness by deformity.

6. It forms one of those influences which have most power over the heart and affections, directly aiding the teacher in the most difficult and important part of his work.

In adorning and decorating school-houses, however, care should be taken lest the cost exceed the means or inclination of those for whom it is built. Neither should any mere ornament interfere with health or comfort.

The plans in this work have been drawn with a continual view to cheapness. While an effort has been made to present well-proportioned buildings, this has been subordinate to the convenience of the school, and the whole has been brought within the limits of ordinary expenditure in school districts. It would be easy to con-

struct ideal forms combining more elements of beauty, but their great cost would interfere with their practical value; and, consequently, they would not advance the object of this work.

Let this principle be remembered by all: "That school-houses, however small, should never be built without conforming to those general principles of taste which are universally recognized by cultivated people," so that if they do not exert a positive influence in elevating taste, at least they will have the negative excellence of not violating it. The work of education in those higher departments, which recognizes beauty both of form and morals, and the subtle and mysterious relations which exist between the two, at best, is an onerous and difficult one, and every external influence which assists in forwarding it becomes a positive benefit.

### CHAPTER III.

#### FAULTS OF OUR PRESENT SCHOOL-HOUSES.

THE past few years have witnessed a great change in public opinion with regard to the construction of school-houses. Many of the worst features of the past age have been, in some measure, remedied; but there is still much to be accomplished in this respect. In most parts of the country, school-houses are still deficient in the following respects:

1. They are the most unsightly buildings in the district. A traveler, passing through a section of country, can generally distinguish the school-house by these characteristics. It is situated in a forlorn and lonely place. It exhibits every mark of neglect and dilapidation. It is entirely exposed to the depredations of stray cattle and unruly boys, by being situated in the street, and not protected by a fence. It is unpainted, and nearly half unglazed. Its style is nondescript, being too small for a barn, too deficient in the elements of just proportion for a dwelling, too lonely and too much neglected for the out-building of a farm, and, in short, too repulsive in all respects, and exhibiting too many marks of the most

parsimonious economy to be anything but a school-house.

2. They are not large enough to accommodate the pupils that attend the school. The room is so confined that the scholars are forced into uncomfortable and inconvenient proximity to each other. Their work is interrupted, and their personal rights violated. The young, the weak, and the innocent are forced into the immediate atmosphere of coarseness and impurity, without a possibility of counteracting influences. Again, the ceilings are so low that there is a very inadequate supply of fresh air, and, as a consequence of all this, unavoidable damage is incurred by both body and soul. Proper discipline, in such schools, becomes a matter of impossibility, as the inexorable laws of nature oppose and render nugatory the teacher's work.

3. No proper means of ventilation are provided. The quantity of air, limited at first, shortly becomes impure, and there are no means of changing it. A poisoning process then commences, the virulence of which is just in proportion to the tightness of the room. A badly built or dilapidated school-house here becomes a positive blessing, by preventing the exclusion of pure air from without. Besides the injury to health, this vitiated atmosphere actually obviates, by its stupefying action on the brain, the purposes of the school.

4. The buildings are miserably put together. The foundations are so poorly laid that they soon tumble, and the superstructures are racked to pieces, or stand askew. The frames and finish are of the cheapest kind, and soon



the winds find their way through them in every direction. The desks and benches are ingeniously inconvenient and uncomfortable, producing pains and aches innumerable. Most people of the present generation have a vivid and painful recollection of the seats of our old school-houses, without backs, and often too high to permit the feet to touch the floor. The suffering and weariness so produced were almost equal to the punishment of exposure at the pillory, or confinement in the stocks, bestowed in olden times upon criminals. The whole construction of the building, both external and internal, was such that it merited and received no repair, and soon lapsed into a mass of ruin.

5. Yards or play-grounds for the children are scarcely ever provided. Even in country places, where land is very cheap, the school-house is frequently—and, in the older States, *most* frequently—placed directly in the street, generally at a corner where two roads meet. Not one inch of ground is set apart for the use of the pupils. There is no place for recreation or privacy, but all is exposed to the public eye. The street is the only play-ground, and filth, within doors and without, is the consequence. With such an arrangement, it is impossible to inculcate those lessons of neatness and refinement which are among the most important objects of education.

6. A majority of school-houses are destitute of the necessary out-buildings. In many cases there is no privy at all; and, in many others, there is but one for a large school of both sexes. A man in a Christian land

who would erect a house for his home without a privy, would be considered worse than a heathen; yet this is often done in the country school districts, although in a school both sexes are brought together without the constant purifying and restraining influences which belong to the household. Every feeling of refinement, and even of decency, is outraged by the exposure thus induced, and in some measure the same results ensue from having but one small, exposed privy for a large school.

7. In fine, it is the united testimony of superintendents, committees of investigation, and boards of school visitors, that in many places the pupils in school are worse provided for in all things belonging to comfort, convenience, and the cultivation of good manners and morals, than the inmates of our pauper-houses, or the prisoners in our penitentiaries.

How to remedy these faults and evils, we shall attempt to point out in succeeding chapters.



## PART II.

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### PRINCIPLES TO BE OBSERVED.

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#### CHAPTER I.

##### HEALTH.

THE preservation of health should be considered a matter of prime importance in the erection of every school-house. Everything else, including cost, comfort, and convenience, should be subordinated to this. Unless our children can be educated in a way compatible with the preservation of their health, it were better at once to tear down our school-houses, and abolish our whole school system. Minds refined, however highly, in broken-down and sickly bodies, are of very little practical value in *this* world.

To accomplish the end so much to be desired in this regard, great care should be taken in the following particulars :

1. THE LOCATION.—This should be at a distance from

all sources of malaria. The foul breath of decaying vegetation, or of stagnant water, becomes a fruitful source of disease and death. Unseen and unnoticed, it insidiously does its work, and spreads the atmosphere of the charnel-house as far as its influence extends. The diseases seeming to be epidemic, which sometimes break out in schools, may often be traced to some neighboring swamp or marsh, or heap of rotting vegetables. Some manufactures also generate disagreeable gases, which, if breathed for any considerable time, are deleterious in the extreme. The school-house should be placed at a distance from all these sources of disease.

Again; it should be situated away from the noise and dust of the street. There is scarcely anything more annoying or unwholesome than the clouds of dust which, upon a dry summer's day, are driven along the highway, covering and clogging everything in their path. Let the location, if possible, be upon a hill-side, where it may be free from these annoyances, and where the purest air is poured out in unstinted measure. For the *moral* health of the pupils, let the school-house be placed at a distance from places where scenes of brutality or debauchery are ever exhibited.

2. THE SIZE OF THE SCHOOL-ROOM.—This is a consideration of great importance. Every pupil should have sufficient room to sit and move without being confined or jostled by any one else; and there should be sufficient space in the room for a large reservoir of air. Packing children close together, so that the breath and atmosphere of each is shared with all his neighbors, is an

unmitigated evil. Every child has a right to his own personality, and his own share of uncontaminated air; and whatever deprives him of these, becomes an outrage. This is often done, however, by the closeness of contact with others, into which he is forced, and by the limited capacity of the apartment in which he is compelled to sit.

3. PROPER MEANS OF VENTILATION.—Within a few years past, much has been said and written upon this subject. Public attention has been called to its necessity and importance in school-books, in lectures, and in treatises; yet even now we often find its most obvious principles disregarded in the construction of school-houses, churches, and other public buildings. Custom and habit are so strong that they ignore and violate natural laws even after they have been pointed out and demonstrated. Both the limits and design of this work forbid a thorough discussion of the subject, and only a few of the more obvious and important considerations will be suggested.

The vitality of the air is exhausted by breathing, and a constant supply of fresh air is necessary to preserve life and health. Air, absolutely pure, is essential to the highest degree of health. Rendered partially impure by breathing, it will sustain life, but then all the machinery of the body becomes clogged, and the brain is so enfeebled as to be unable to perform its functions. Every person contaminates, and renders unfit for use, at least five cubic feet of air per minute. A school-room, twenty by thirty feet in size, and ten feet high, would contain six thousand cubic feet of air. Forty scholars would

consume this, and render it unfit for sustaining the bodily functions, in just thirty minutes. Yet a larger number are often confined in a smaller room, and during a much longer time, without any possibility of a change of air. The effect of this is to excite disease and impair the more delicate organs of the body. The most virulent poison could scarcely be more fatal. The only remedy is to provide means for the rapid and frequent change of the air in the room, throwing out that which is contaminated and impure, and replacing it with that which is fresh from without. The means of accomplishing this will be fully explained in another chapter.

We content ourselves, for the present, with a single emphatic observation. *In every school-house without proper means of ventilation, there is a slow and subtle poison which enters the blood and brains of the pupils, and saps the very foundation of life. There can be no escape from its deleterious influences, for exposure to it is a violation of one of the laws of God.*

4. THE CONSTRUCTION OF SEATS AND BENCHES.—For the health of the pupil, as well as for his comfort, the height of the seats ought to be so graduated as to enable him to set his feet squarely upon the floor. A contrary custom often produces much suffering and a distortion of the lower limbs. Seats without backs are also to be deprecated. To relieve the overstrained muscles, unnatural postures are assumed, and a crooked spine is a very probable consequence.

5. PROPER ATTENTION TO CLEANLINESS.—It scarcely comes within the province of this work to descant upon

the importance to health of keeping the person and clothing clean, yet it is a subject intimately connected with that of the wholesome ordering of the school-room. As health can not be preserved without habits of personal neatness, so it is useless to inculcate these upon pupils while the dirty condition of the room they are obliged to occupy forbids the acquisition or preservation of those habits. Besides, the fine dust which accumulates in a school-room, and which is thrown into the air by every motion, is breathed into the lungs, and there acts mechanically upon the delicate little air-cells, producing irritation, which may end in inflammation and consumption. Methods of preserving cleanliness will be noticed in succeeding chapters.

## CHAPTER II.

### EXTERNAL ARRANGEMENTS.

THE external arrangements of the school may be noticed under the following heads:

1. THE LOT.—A large and commodious school lot is a matter of prime necessity. Without it, some of the most essential ends of education are impossible to be attained. A little attention, on the part of trustees and committee, will secure an ample lot at very little expense. When public attention has been sufficiently turned to the importance of this subject, it will be a comparatively easy matter to secure the donation of a school lot, or, at least, the purchase of one at a small price. About one acre of ground is necessary for our ordinary country districts. If such a lot can be obtained, a school-house should never be erected upon a smaller one. It sometimes happens that the owners of land near the center of the district refuse to sell it at any price for school purposes. Such narrowness and illiberality is at present, in most of our States, without remedy. But we think, as popular education is now recognized as one of the functions of the State, it would be well to provide for taking the land, at



an appraisal by disinterested persons, as land for highways, railroads, and other public purposes, is now taken. A law allowing the trustees of districts and the town authorities to locate the school-house lot, with or without the consent of the owner of the land, would be a highly salutary one, and would prevent a great amount of private and social strife, while rendering an important service to the schools.

If no natural obstacle oppose, the center of the district would seem to be the best place for the school-house; this center having reference, of course, to population as well as distance. If an acre of land is taken, perhaps it might most conveniently be laid out in a plot sixteen rods front and ten deep. Any other form might be adopted, and, under some circumstances, another might be preferable. Of the situation of the lot, in reference to scenery, etc., more will be said in the chapter upon ornamental grounds.

2. POSITION OF THE BUILDING.—In a lot, sixteen rods by ten, the house should stand very nearly in the center. This would be at a sufficient distance from the street to avoid all noise and dust, with room enough in the rear for the necessary out-buildings. It would also divide the yard into two parts, for boys and girls. In any lot the house should be placed in the middle as to width, and at a distance from the street. The front of the house should always face the street, so that the out-buildings may be thrown into the back-ground, not only in reference to the house, but to the street also.

3. OUTSIDE STRUCTURE.—The details of this will be

more particularly noticed in the description of the plans. In most cases, it will be observed, a double porch, with separate entrances for boys and girls, has been provided, and this arrangement is regarded as highly important. It prevents the possibility of improper communication between the two sexes, while passing in and out of the school-room. The room in the lobby is also used for a clothes-room, at a manifest saving of expense.

4. WOOD-HOUSE.—In most of the plans proposed the wood-house is placed directly in the rear, so that a portion of it may serve for a back hall. This arrangement contributes to harmony of external appearance, and prevents the out-door air from blowing directly into the school-room. Thus serving a double purpose, the wood-house is almost indispensable. A basement, however, might be prepared for the storage of fuel.

5. PRIVIES.—With the yard divided by a high, substantial board fence running from the back side of the wood-house to the rear fence, two privies are indispensable. In Designs I. and II., an arrangement is given for a double privy directly in the rear of the wood-house, but this arrangement is objectionable, unless plenty of water can be obtained to flow through the vault into a sewer. Even if a double privy is decided upon, it would be better to place it at a greater distance from the house, so as to preclude the possibility of its becoming offensive. But any double privy is objectionable; although so arranged as to shut out the intrusive gaze, it can not be made entirely impervious to sound; and the vicious may take advantage of its construction to outrage the feelings



of the pure-minded, without the fear of detection. A better way would be to separate the privies entirely, and place them near the middle of the remote ends of their respective yards. The entrances should be upon the rear side, or else a screen should be erected to shield them from observation. The expense of two vaults and two buildings would of course be somewhat greater than that of single ones; but the obvious good resulting from the plan would more than compensate for the difference.

6. WALKS.—That is a very false economy which refuses or neglects to furnish the necessary walks in and about the school premises. The country school-house is proverbial for filth. Generally but a step removed from the carriage-path in the street, and without walks of any description anywhere in the vicinity, except a single path of the native soil, the wonder is that it is not more, rather than less, offensive. During some seasons of the year the children must wade through mud and water to reach the school, and not one foot of dry space is provided where they can cleanse themselves until they enter the house itself. The consequence is, that dirt is everywhere, and tidiness impossible. To remedy this as much as possible, arrangements should be made to preclude the necessity of getting into the mud, within the school-yard, and to enable the scholars to remove it from their feet, when coming in from the road. A plank or gravel-walk should be laid from the front gate to the front door. The steps at the door should be large and commodious. These steps, and perhaps also a portion of the walk,

should be provided with scrapers. A strip of band-iron, nailed upon the edge of a plank twelve feet long, so that the edge of the iron may rise half an inch above the surface of the plank, will make an excellent and economical scraper, and accommodate a dozen or more pupils at the same time. Plank walks should also extend from the back entrances to the privies, and perhaps around the sides of the school-house.

7. FENCE.—The school-lot can never be kept in order unless it is inclosed by a good and substantial fence; this fence should be built of good materials, and put up in a solid manner. A picket, or a post-and-rail fence, would answer every purpose. The gates should be built strong and heavy, and so arranged as to shut of themselves. It might be well to set posts within the gates in such a manner that cattle could not get in, even if the gates should be left open. The fence that divides the yard should be of a matched stuff, and from eight to ten feet high, faced on the boys' side. The wood-house door should open into the boys' yard. In a succeeding chapter the subject of out-houses will be treated more at large.

## CHAPTER III.

### INTERNAL ARRANGEMENTS.

THE internal structure of the school-house may be considered under the heads of Size, Shape of School-Room, Side-Rooms, Seats and Desks, and Miscellaneous Suggestions.

1. SIZE OF SCHOOL-ROOM.—A school-room should always be sufficiently large to furnish each pupil with space enough for a desk and chair, and for free and unobstructed movement. There should also be room for the personal accommodation of the teacher, and for purposes of recitation. The height of the smallest school-room should never be less than twelve feet, and this should be increased to sixteen feet in the larger houses. Comfort and convenience, in sitting and moving about, depend upon the area of the room, the quantity of air upon the area, and height combined. In the plans furnished in this work, eighteen feet area, and nearly two hundred and fifty cubic feet of air, have been appropriated to each pupil.

2. SHAPE OF THE ROOM.—Of all rectangular forms, a square room will give the greatest amount of space, in

proportion to the extent of outside wall. Many teachers, however, prefer a room one fourth or one fifth longer than its width; and probably no better form can be devised than this, or one between this and square. When the parallelogram is used, it will be found more convenient to leave the space for the teacher's desk, and recitation benches, upon the end, instead of the side. The octagonal form is thought by some to be peculiarly adapted to school purposes, and specimens have been presented in this work.

3. SIDE-ROOMS.—In every school-house there should be a separate room for depositing hats, bonnets, etc., and, in the larger houses, another for library and apparatus. For the sake of economy and convenience, in the plans here given, the porch has been so arranged as to serve the double purpose of entry-way and clothes-room. In the smaller houses, a single porch will be sufficient; but in the larger ones, a double porch should be provided, so that there may be ample room for the uses to which it is to be put, and a complete separation of the sexes. These rooms should be amply provided with hooks and shelves. In the smaller houses, a case for books and apparatus, answering every purpose, can be constructed upon one side of the school-room, in the place designated in the plans. In houses designed to accommodate more pupils than any one teacher can instruct, an additional room for recitation should be provided. A separate room, for the teacher to occupy during recesses and intermissions, and to retire to, when wearied and perplexed with the cares and duties of the

day, is also very desirable; but we fear this reasonable luxury will not be realized until public sentiment, with respect to the educational profession, is made liberal far beyond its present level. Every wood-house should be so arranged as to form a back entry-way as well as a store-house.

4. SEATS AND DESKS.—Many methods for seating school-houses have been proposed, and many experiments have been made, to economize room and to secure the greatest convenience. It now seems to be generally conceded that the best arrangement is that of single or double desks, placed in parallel rows, with aisles between of sufficient width to permit passage. By this plan the pupils all face one way, and the teacher can see them all at a glance. When the seats are arranged upon the sides of the room, with the open space in the center, this is impossible, and discipline is almost out of the question. Double desks are more economical than single ones, as they cost less, and take up less space in the room.

*The desks should always be so placed that the pupils may face the entrance.* The reasons for this arrangement are obvious. The entrance and exit of pupils or visitors will be sure to attract attention, and it is impossible to prevent this by any proper system of discipline. If the backs of the pupils are toward the entrance, they will turn about, whenever the door opens or closes, presenting an unseemly appearance, as well as seriously interfering with the business of study and recitation. This habit of turning, once formed, will be practiced upon other

occasions, to the great annoyance of the teacher and the subversion of discipline. Again, when strangers or others visit the school, or call at the school-room for any purpose, the teacher is obliged to receive them at the rear end of the room, instead of in front, which is awkward and inconvenient. It is as though the entrance to the parlor of a private house should be made through the kitchen. With the pupils facing the entrance, when the door opens, a glance is sufficient, without change of posture or suspension of business, to satisfy the most vagrant curiosity. The teacher can receive his visitors at once, and in the proper place, without parade and without difficulty. Finally, the door or doors leading to the wood-house or back-yard should be in the rear of the room, and this can only be when the front of the room is next the front entrance. The author can speak feelingly upon this subject, having had experience in both methods, and retaining a vivid remembrance of the constant annoyance to which he was subjected in the rooms where the pupils were seated with their backs toward the entrance.

The space in front of the desks should be sufficiently large for purposes of recitation; this, in school-rooms of ordinary size, would be about ten feet; in small rooms, perhaps a little less. A space of two or three feet in width should be left in the rear of the room for classes upon special occasions. The side aisles should not be less than two feet each. Those between the rows of desks might vary, according to the size of the room, from a foot and a half to two and a half feet.



5. MISCELLANEOUS SUGGESTIONS.—The stove should be placed near the door, so that the air may be warmed, to some extent, before its distribution through the room. The entire length of the front of the room should be occupied by a black-board, or a black wall; and if more than this is needed, it may be placed upon the sides of the room, between the windows. If a platform is used, let it be not more than six or eight inches high. An unbroken level of floor is much better than any platform, because it allows greater freedom of movement and a greater amount of air in the room.

## CHAPTER IV.

### GENERAL CONSTRUCTION.

THE style of architecture in school-houses should receive its share of attention ; and some general principles should be fixed as a guide for those intending to build. The old style, or, rather, no style, we put entirely out of the question, as its whole object was to provide the cheapest possible shelter, without any other reference to utility, and none whatever to beauty. What shall take its place, is a question of present and pressing interest. Many styles have been proposed, but none as yet have been generally adopted.

The two which have attracted the most attention, and which have most frequently been described in works upon the apparatus of education, are the Greek and the Gothic. These styles are now frequently found in those places where considerable attention has been paid to improvement in schools, and they have been strongly recommended by those who have written upon the subject. Some inquiry into their respective claims may not be out of place here.

1. When we speak of school-houses in the Greek style

we mean those in whose construction some features of the Greek architecture have been displayed. For example, we often see the Greek cornice extending around the building, with the tympanum upon the gables; pilasters, surmounted with capitals, in imitation of the Greek columns; the Greek pitch to the roof; and, in many cases, the Greek portico. All these forms are beautiful in themselves, and, in their original combinations, unrivaled in architecture. But their adaptation to the purposes and uses of a school edifice may well be questioned.

The Greek architecture was developed chiefly in the construction of temples for religious worship, which were not designed so much for use as to please the eye. Only the outer and inner colonnade were covered; the god to whom the temple was dedicated was supposed not to need a roof, and hence none was provided. All the marvelous skill and energy of this remarkable people were employed in developing this style of architecture, and the result was very nearly perfection. The impression which such a building makes upon the mind is that of sublimity. But an indispensable element in this sublimity is magnitude. A diminutive structure can never call up the emotion of the sublime; and hence when the Greek forms are used in the construction of small buildings, the old maxim is illustrated, that "there is but a step from the sublime to the ridiculous."

Not only were the Greek temples roofless, but they were also usually windowless; and when we reduce them to modern, every-day uses, we are obliged to depart from the model in these two important particulars. Orig-

inally, genius, labor, and treasures were all expended upon the colonnade; but little attention was given to the interior, and therefore it has been found impossible to adapt forms so developed to buildings in which the interior is the most important part. When the Greek temple is copied entire, it is found that the immense colonnade occupies a large share of the most valuable space, and hence the form is the very worst that can be devised for use. If only certain features are engrafted upon other forms, the results are defective and incongruous. Another consequence is a great expenditure of labor and material, without any adequate return, either in convenience or beauty. For example, if the Greek cornice and tympanum are used with the ordinary pitch of roof, the laws of proportion are palpably violated; but if the original pitch is preserved, and shingles are used, the roof is too flat, and soon decays. The horizontal cornice, across the gable, which forms the base of the tympanum, is entirely useless; as are the capitals upon the pilasters. When any of these ornaments are used in the construction of ordinary school-houses, they always wear a pretentious and, at the same time, meretricious appearance. We are inclined to adopt, as an incontrovertible principle, that *Greek forms should never be used except in the largest and most costly buildings*. Their introduction into school-house architecture was unfortunate, and we trust the time is not far distant when they will fall into disuse.

2. The style known as the Gothic was also first developed in the construction of temples, and its pecu-

liarities were all in harmony with the original idea. In this the interior was regarded as the most important, and everything was subordinated to the perfection of its finish. The steep roof was thrown up to give opportunity for the high-pointed arches inside, which, in the dim shadowy light, excited emotions of solemnity and awe. When we interpose ceilings in Gothic structures, we depart from the original idea, and the high meaning of the style is lost. In later times great variety has been introduced into Gothic structures, making them peculiarly beautiful to the eye; but this variety is only obtained at the expense of economy and convenience, and is utterly impracticable in a simple building like a country school-house.

A Gothic roof, however, has often been used, and is now popular in some sections of the country. Let us examine it a little. There are two methods of constructing buildings with such roofs.

1. By making the walls low, and finishing the room into the roof; and, 2. By making them with ceilings, in the usual manner. The former is objectionable in summer, because it furnishes no protection from the burning rays of the sun, falling directly upon the roof; and both are much more expensive, in consequence of the greater amount of materials and labor required to construct the roof and cornice. Besides, a very steep roof wears out sooner than one of less pitch.

In the plans given in the following pages, great care has been taken to avoid all mere pretension. While due regard has been had to artistic design, everything has

been subjected to the most rigid scrutiny in reference to expense. The great object has been to give such models as may embody all the necessary conveniences, together with a fair degree of beauty, at the least possible cost. Things useful have been constructed with careful reference to their appearance; but ornament, for the sake of ornament, has been rejected. While we make no claim to peculiar and original combinations, we have endeavored to satisfy the present wants of the community, and, at the same time, to take a step toward a better state of things in the future.



## CHAPTER V.

### LIGHT, HEAT, AND VENTILATION.

1. LIGHT.—In cities, it often happens that the school-house is so shut in by adjoining buildings, that it is impossible to obtain sufficient light; but in country districts there is no difficulty in securing this indispensable element in any degree for the school-room. The only question, then, is, how to admit and distribute the light so as to produce the most pleasing effect. The ordinary fault of our school-rooms, in this respect, has been in an excess rather than in a deficiency, and also in the manner of its introduction. Light need never be admitted upon more than two sides of an apartment; and it is best to have these sides opposite each other. Light entering in two directions, at right angles with each other, produces a disagreeable effect, although the arrangement is sometimes unavoidable. Windows should always extend upward, as far as is consistent with their due proportion to the dimensions of the room. As a general rule, no windows should be placed in front of the pupils; or if the appearance of the building should demand such windows, they should be closely curtained.

In the construction of school-houses, it will usually be found more convenient to place the windows in the opposite sides of the room, and not in the front or rear. The front side is generally occupied by the porch, and the back side by the wood-house. The windows should always be provided with blinds or curtains. Blinds are much to be preferred, and it would be better to place them inside. Outside blinds afford but little protection to the glass, in any case, and none at all against malicious injury. On the other hand, when hung on the inside, they may be much more easily adjusted, and the supply of light may be better regulated.

Much has been said and written about the superiority of the north light and the sky-light, but it is questionable whether they are to be preferred for a school-room. The north light is the most unvarying, and the sky-light is the strongest of all the applications of light to interiors; but both exclude the sunshine. The rays of the sun diffuse a happy spirit throughout a school. If their directness and intensity be subdued and modified by blinds or curtains, they render the room much more pleasant than if shut out by walls of wood or stone.

The sky-light may be used with propriety in a variety of forms, as, for example, the octagon; but in most cases it involves extra expense, unless side windows are omitted entirely, and this would give too much the appearance of a prison.

2. HEAT.—How to heat houses so as to economize fuel, and to afford an even temperature, has been the subject of a great variety of experiments, resulting in many

admirable inventions. The hot-air furnace and the steam apparatus are both excellent, and their merits should be fully considered by any one who proposes to construct a building with many rooms, or to warm any large space; but owing to their great cost, neither of these is adapted to the wants of our country schools, and a discussion of them here would be out of place. Until the realization of Paine's theory of burning water, or something akin to it, wood and coal stoves will be the common means of heating school-houses. But all stoves are not alike; and a sound discretion may be exercised in choosing the best kinds, and placing them so as most effectually to economize and equalize the heat.

An air-tight box stove, with diving flues, is one of the best forms for an ordinary wood-stove; and the tall, cylindrical stove, with the same kind of flues, is among the best kinds of coal-stove for our purpose. The diving flues are important, as they afford a secondary radiation, and a greater amount of radiating surface near the floor. The first radiation from very hot iron is almost insupportably intense, and any plan that modifies it without diminishing the amount of heat, is of great value. There are forms of stoves which have air-chambers around the fire, so that the heat is distributed by currents of hot air, and by secondary radiation, which is a great improvement on the ordinary methods. A stove of this kind, the air-chamber being supplied with cold air from without, has many of the advantages of a hot-air furnace, without its cost. These stoves are valuable for their equal distribution of the heat, and because they aid ma-

terially in the process of ventilation, as will be shown hereafter.

The best situation for the stove is the center of the room, as from this point the heat radiates more equally throughout the apartment than from any other; but, as rooms are usually arranged, this is impossible. Perhaps the next best place is near the door, that the cold air may be somewhat modified upon its entrance into the room.

3. VENTILATION.—The limits of this work forbid a thorough, philosophical dissertation upon the nature and necessity of ventilation. Enough has been said, under the head of "Health," to show its importance. We now propose to present a cheap and simple method of effecting it. On account of its heat, vitiated air from the lungs rises to the top of the room; but the specific gravity of carbonic acid, of which it is principally composed, being greater than that of common air, it settles to the bottom, as its temperature becomes reduced. Means of ventilation should therefore be supplied both at the top and the bottom of the room.

To attain the desired result in the cheapest and most effectual manner, perpendicular flues or boxes should be placed in the walls in two places, at least, in each room. These boxes should extend from the bottom of the room to the ceiling, and along the slant of the roof to the top, where they should open into a ventilating chimney. If the attic is made perfectly tight, the flues need not extend further than the ceiling, as the draught can thus be created equally well; but in ordinary buildings it is

much safer to continue them to the top. The chimney should be so constructed as to create a draught, from whatever quarter the wind may blow. There should be an opening in each flue at the top of the room, and another at the bottom; each opening furnished with some kind of register, which can be opened or closed at pleasure. The philosophy of their operation is easily understood, and in connection with the ventilating stove, before described, they may be made perfectly effective.

While the room is heating, let the upper registers be shut, and the lower ones open. The cold air box receives the air from without, and conducts it to the air-chambers of the stove, where it becomes heated. A part of it then rises to the top of the room, and a part mingles with the cold air already there. As it rises, it presses downward upon the cold air, and drives it out through the open ventilators at the bottom of the room, which by this process becomes speedily warmed. When it is sufficiently warm, let the bottom registers be shut, and it will remain so. If the registers at the top are now opened, the vitiated air may escape through them as it rises; thus keeping up a perfect circulation, and securing a continual supply of pure air. If common stoves are used, cold air must be occasionally admitted through doors or windows to drive out that which is heated and vitiated. Provision should always be made for the admission, as well as the expulsion, of air, or no ventilation will take place. Window-sashes should always be so constructed as to be lowered from the top, as well as raised from the bottom, and great care should be taken by teachers to

open the windows at the recesses ; and at other times, if necessary to effect a complete change of air.

Ventilation is sometimes sought to be obtained by merely making an opening in the ceiling into the attic, the theory being, that the vitiated air of the room will rise through the opening and escape into the open air through the crevices in the roof. This theory is incorrect, as the crevices are not sufficiently large for the escape of the impure air ; and if they were so, they would serve as inlets of cold air, rather than outlets of warm. To make attic ventilation of any worth, the open space must be connected with a ventilating chimney which rises sufficiently high to produce a constant draught ; and even then the whole process is difficult of management, unreliable, and vastly inferior to that which has already been described.

The placing of windows, stoves, and ventilators will be more fully noticed in the details of the plans, to which particular attention is requested.



## PART III.

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### ELEVATIONS, PLANS, AND DETAILS.

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#### CHAPTER I.

##### PRELIMINARY.

THE arrangements and details of the following plans have been made with special reference to the demands of education, and the wants of school districts. While an effort has been made to give a sufficient variety to suit the different tastes of those interested, a certain uniformity has been observed, for the purpose of making the whole more practical, and of combining economy with the best possible arrangements.

The difficulty of raising money for building purposes, in many of our sparsely-settled districts, has been fully taken into consideration, and a series of plans has been given to meet the wants of such districts. But while rigid economy has been kept continually in view, no effort has been made to cater to that parsimony which

would refuse to provide *healthful* and *comfortable* accommodations for the children while attending school. The vital interests of education, and the future welfare of the world, both forbid that, even tacitly, the spirit should be fostered that would save money at the expense of the health and happiness of whole generations of children.

While, then, economy has been consulted in the construction of every part, it has not been done to the neglect of higher considerations. Rooms have never been cramped in size so as to afford an inadequate supply of fresh air, nor have constructions been recommended that would not secure a perfect protection from the elements, although thereby less expense might have been incurred.

The series of plans are designed to embrace all sizes of houses ever needed in country districts, and many which may serve for village and union schools. Of the cheaper houses, eight sizes are given, accommodating, respectively, 24, 30, 40, 48, 60, 70, 84, and 96 pupils. The form, size, and arrangements of these rooms have been made the subject of careful study, and it is believed that no cheaper form can be devised that will unite so many excellences.

Besides these, several plans of houses have been given, consisting of one, two, three, or four rooms, varying in style and construction, and designed to give variety, and to meet the wants of village and union schools. Several of these designs are ornamental, and, consequently, more costly than the others; for as soon as we depart from

the sternest simplicity in construction, additional expense must be incurred.

In regard to materials of construction, styles adapted to both wood and brick have been given. Wherever it can be economically used, brick is much to be preferred, on many accounts. Brick houses, with hollow walls, are warmer in winter, cooler in summer, and more durable than wood.

Each of the cheaper plans is accompanied by the drawings and description of all the details of construction and finish, bills of materials and labor, and specifications to form the basis of contracts for building. The plans are all drawn to a scale, and any carpenter that understands the use of tools can put up a house precisely as described. The prices of labor and materials are carried out as they were at Syracuse at the time the book was written, and of course will vary in different parts of the country. In many places the price of lumber will be less than half that which is here given.

The more elaborate plans are not accompanied by details, for the reason that they would occupy too much space and increase the expense of the book. Should any of these latter plans be adopted, any architect or carpenter, accustomed to drawing, would furnish the details.

The *plans* are all drawn to the scale of a sixteenth of an inch to a foot; and the details to a scale of a half inch to the foot, except in a few cases where the scale is given.

## CHAPTER II.

### CHEAP HOUSES OF WOOD.

IN their construction and finish, the plans given in this chapter are designed for those districts where wood is the material used. The general plan adopted, it is believed, combines more excellences than any other. It is well proportioned, economizes room, furnishes a plentiful supply of air, and is calculated to secure the health of the pupils. Nothing that is necessary to a good school is omitted, and nothing is admitted that is unnecessary.

The building itself is just large enough to accommodate the required number of pupils. The porches are ornamental, but they are also used for both entry-ways and clothes-rooms. The wood-house is constructed so as to add to the symmetry of the whole building, but at the same time it is useful for the double purpose of storing wood, and as a back entry-way. The roof has the precise pitch required for shingles; a flatter one having a tendency to leak, and a steeper one costing more, without being any better. The batten outside finish is given, because it is warmer, more durable, and more beautiful than the ordinary siding. All of the finish is of the cheapest and most substantial kind, and we venture to say that no building can be devised that would combine so many excellences at so little expense.

## DESIGN NO. I.

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THIS is the smallest of the series, and the smallest school-house that should ever be erected. It is designed to accommodate 24 pupils. By adding 3 feet to the length of the building, space will be afforded for another row of desks, and the room will accommodate 30 pupils.

Fig. 2.—Building,  $30 \times 24$ , 13 feet posts.

- A. Porch,  $4 \times 6$ .
- B. Wood-House,  $12 \times 12$ .
- C C. Privies, each  $4 \times 4$ .
- D. Passage,  $4 \times 12$ .
- E. Space in front of Desks, 7 feet wide.
- F. Space in rear of Desks, 3 feet wide.
- G G. Aisles, 2 feet wide.
- H H. Desks,  $3\frac{1}{2}$  feet long, and, with chair, occupy 3 feet in width.
- I I. Recitation Seat.
- J J. Blackboard.
- K. Case for Books and Apparatus.
- S. Stove.
- T. Table.
- V V. Ventilating Flues.
- X X. Railing separating Wood-House from Passage.

## DETAILS OF BUILDING.

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FIG. 3 is an elevation and section of a portion of the building frame, and sections of two kinds of batten.

A A is a portion of one corner, and shows the plan of the frame, and the manner of boarding and battening.

B B is the foundation or underpinning walls, and shows that the frame must stand flush with the walls.

C C C are sections of the frame in elevation. The sills are  $10 \times 2''$ ; the floor joists,  $8 \times 2''$ ; the ceiling joists,  $6 \times 2''$ ; the plates, the upper girts, and the posts are  $6 \times 4''$ ; all other girts, the studs and braces, are  $4 \times 2''$ ; and the rafters are  $5 \times 3''$ .

D is the section of a rafter and finish. The rafters are planed as far as they project, and the roof-boards are planed and matched over the projection, and let into the rafters the thickness of the board. The facia is nailed to the rafters, and the crown mould to the facia, which completes the cornice.

E E represents two kinds of batten, full size.

Light frames of this kind can be made so as to effect a great saving of both material and labor; they are as strong and substantial as though made of much larger timber. When light sills of this kind are used, a foundation of well-laid mason-work is indispensable. The battens should be hollowed on the under side, as in the drawing, and should be nailed on by one row of nails driven through their centers, to prevent warping and splitting by shrinkage.



## DETAILS OF BUILDING.

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FIG. 4 is a plan, section, outside and inside elevation of a window for a wooden building.

A shows the plan of the window-frame.

B is a vertical section of the window-frame.

C is an outside elevation of the window.

D is an inside elevation of the window.

This window-frame may be made as follows: first, put the inside face-casings on to the jambs; then set the frame, nailing it to the stud, *a*. The siding forms the outside face-casings and completes the frame.

The section B shows the width of the sill and the transom of the frame, and how the siding is finished up to it. The cap and pendant, as shown at C, is made concave on the back and nailed to the face of the siding. The pendant should come exactly over a joint of siding, and the batten continue from the pendant down.

The inside face-casing may be made much narrower than shown in the drawing, if it should be preferred.

Fig. 5 represents an elevation of the pendant and a section of the window-frame, both half size. The dotted line upon the pendant shows the projection or thickness. A, siding, B blind stop, C C sash, P parting strip, F inside sash-stop, G inside face-casing, E jambs.

## DETAILS OF BUILDING.

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FIG. 6 is a plan, section and elevation of an outside door.

A, plan, B section, C elevation, a a a threshold, b b b door, e e cap or hood, to be made and put on as described under fig. 5.

This plan and section show the position of all the members that compose the whole door-frame and casings, outside and inside. Let the threshold-jambs and transom be dressed and brought to a width required by the *building frames*; then plow the jambs and transom for a door-stop; frame the jambs to the threshold and transom; square the frame; put on the inside casings, and put in the door-stops; set the frame in its place, plumb and level; then put on the siding which completes the casing; and lastly, put on the cap or hood, as already described.

Fig. 7 is an inside elevation of the same door and casings; and a section of the casings half size.

A A, siding, B door, C stop, D casing.

## DETAILS OF BUILDING..

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FIG. 8 represents a plan of the base and cap, and an elevation and section of a ventilator top. It will be necessary to make the ventilator top as large as the sum of all the flues that lead into it, and have their escape through it. The whole top may be made of wood, but it is better to make the horizontal cap, A, of sheet-iron or zinc, and secure it in its place by small iron braces, as shown at B. The projection of the base, C, should stand upon the *top* of the shingles, so as to secure it against leakage. The posts, E E, should be fastened to collar-beams two or three feet below the point of the roof, so that the top may be firm and secure.

This peculiar form is given to ventilator tops, so that in whatever direction the wind may blow, a draught will be created. If the top is left open, or simply arched over like a chimney, the wind will sometimes cause an indraught, and the whole process of ventilation will be reversed.

## BILL OF MATERIALS AND LABOR FOR DESIGN NO. I.

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### MAIN BUILDING.

#### MASONRY:

28 perch of Stone Wall in under-pinning—Stone, 5s., Laying, 5s. per perch .....	\$35 00
500 Bricks in chimney—Bricks \$5, Laying \$4 per M. ....	4 50
160 yards of Plastering, at 1s. 6d. per yard .....	30 00

#### CARPENTER AND JOINER WORK:

FRAME—2 Sills .....	24 ft. long, 10×2"=	80 feet.	
2 " .....	20 " 10×2"=	67 "	
4 Posts .....	13 " 6×6"=	156 "	
2 Beams .....	20 " 6×4"=	80 "	
2 Plates .....	24 " 6×4"=	96 "	
37 Floor Joists .....	12 " 8×2"=	592 "	
18 Ceiling Joists .....	20 " 6×2"=	360 "	
24 Rafters .....	14 " 5×3"=	420 "	
140 Girts, Studs, and Braces. 13 "	4×2"=1,213 "		
Total .....		3,064 "	
3,064 feet of Lumber, at \$8 per M. ....			\$24 51
Framing and Raising the same, at \$7 per M. ....			21 44
ROOF—830 Roof Boards, at \$8 per M. ....			6 64
6,000 Shingles, at \$3 per M. ....			18 00
Labor, Boarding, and Shingling, at \$1 25 per square. ....			10 38
500 Plank, 1½ inches thick for Eave Cornice, at \$24 per M. .			12 00
Nails and Labor in making the same, at \$24 per M. ....			12 00

# BILL OF MATERIALS AND LABOR.

63

WALLS—1,600 Siding, 1½ inches thick, planed and matched, at \$18	
per M.....	\$28 80
Nails and putting on the same, at \$10 per M.....	16 00
1,300 linear feet Battens, dressed and laid.....	13 00

FLOOR—600 Flooring, 1½ inches thick, planed and matched, at \$18	
per M.....	10 80
Nails and Labor in laying the same, at \$5 per M.....	3 00

WINDOWS AND DOORS—4 Windows, Frames, Sash, Glass, and Casings, each 18 lights, 8×10 glass, at \$4 per window	16 00
2 Doors, 8×3' Trimmings and Casings, at \$7 per door...	14 00

## PORCH.

### MASONRY:

4 perch of Stone Wall, at \$1 25 per perch.....	\$5 00
20 yards Plastering, at 1s. 6d. per yard.....	3 75

### CARPENTER AND JOINER WORK:

FRAME—2 Sills ..... 4' long, 8×2" }	} = 18 ft.
1 Sill ..... 6' " 8×2" }	
2 Posts.....10' " 6×4" = 40 "	
4 Joists..... 6' " 8×2" = 32 "	
20 Studs, Rafters, etc.....13' " 4×2" =173 "	
Total.....	263 "
263' Lumber, at \$8 per M.....	\$2 10
Framing the same, at \$8 per M.....	2 10

ROOF AND WALLS—100' Roof-boards, laid.....	1 00
750 Shingles laid, and Nails .....	3 38
Cornice, Labor and Materials .....	4 00
200' Siding, 1½ inches thick, at \$18, laid.....	4 50
120' Battens, linear measure, laid.....	1 20

WINDOW AND DOOR—1 Window, 12 lights, complete.....	3 00
1 Door, 8×3', complete .....	7 00

## WOOD-HOUSE.

## MASONRY:

3 perch of Stone Wall, in piers, at \$1 25 .....	\$3 75
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## CARPENTER AND JOINER WORK:

FRAME—3 Sills .....	12' long, 6×6"=108 feet.	
2 Plates .....	12' " 6×6"=	72 "
2 Posts .....	10' " 6×4"=	40 "
8 Girts and Braces .....	13' " 4×2"=	69 "
30 Studs .....	10' " 4×2"=	200 "
12 Rafters .....	8½' " 5×3"=	127 "
4 Joists .....	12' " 6×4"=	96 "
Total .....	712	"
712' Lumber, at \$8 per M. ....		\$5 69
Framing and Raising the same, at \$8 per M. ....		5 69
ROOF—216' Roof Boards, at \$8 per M. ....		1 72
1,500 Shingles, at \$3 per M. ....		4 50
Boarding and Shingling, at \$1 25 per square .....		2 70
Cornice, Labor and Materials. ....		9 00
WALLS AND FLOOR—400' Siding, 1½ inches thick, at \$18 per M. ...		7 20
Nails, and putting on the same, at \$10 per M. ....		4 00
300' Battens, linear measure, laid .....		3 00
100' Plank, 2" thick, for Platform Floor, laid .....		1 24
WINDOW AND DOORS—1 Window, 12 lights .....		3 00
3 Doors, 7'×2' 8" at \$6. ....		18 00

## PRIVY.

## MASONRY:

18 yards Excavation, at 20 cents per yard .....	\$3 60
13 perch of Stone Wall, at \$1 25. ....	16 25
23 yards of Lath and Plaster, at 1s. 6d. per yard .....	4 31

## CARPENTER AND JOINER WORK:

FRAME, ROOF, AND WALLS—14 Sills, Joists and Studs, 8' long,	
..... 6×4"=	224 feet.
16 Studs, Braces and Rafters, 12' long .... 4×2"=	128 "
Total .....	352 "



# BILL OF MATERIALS AND LABOR.

65

352' Lumber, at \$8 .....	\$2 81
Framing, etc. ....	2 81
130' Roof Boards, laid .....	1 50
1,000 Shingles, laid .....	4 00
Cornice, Labor and Materials .....	4 00
250' Siding, at \$18 per M. ....	4 50
Laying the same .....	1 00
200' Battens, laid .....	2 00
WINDOWS AND DOORS, ETC.—2 Windows, 4 lights each, at \$2 50..	5 00
2 Doors, 7'×2' 4", at \$5 00 .....	10 00
Floor and Inside Finish .....	2 50

## SUMMARY.

Main Building .....	\$276 07
Porch .....	37 03
Wood-House .....	69 50
Privy .....	64 28
Total .....	<u>\$436 88</u>

## SPECIFICATIONS.

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EXCAVATIONS.—Trenches are to be dug for the foundation walls of sufficient depth to commence the walls below the action of the frost. The privy vault is to be six feet deep. All the earth is to be properly graded around the foundation walls.

FOUNDATION WALLS.—The foundation walls are all to be built of good wall stone, well laid in good lime and sand mortar. All walls are to be commenced below the action of frost, are to be  $1\frac{1}{2}$  feet thick, and are to show  $1\frac{1}{2}$  feet above the grade. The walls are to be built to the size of the frame, so that all the sills of the frame shall be flush with the outside of the finished walls. One wall is to be built across the center of the building for the joists to rest upon. The privy wall is to be laid in cement, and plastered with the same inside.

FRAME.—The frame is to be made in the manner shown and described under fig. 3. All the timber is to be of the sizes there marked, and according to the bill of materials which accompanies this design. The framing timber must be all sound and straight. All the sills are

to be bedded in mortar when placed upon the walls. All the timber designed for lath are to be placed 16 inches from center to center; the floor-joists 20 inches from center to center; and the rafters not above three feet from center to center. The ceiling-joists are to be supported in the center by stay-laths attached to the rafters.

**SIDING.**—The frame is to be covered with pine boards, 1½ inches thick, planed and matched. The boards are not to exceed one foot in width. Each joint, and the corners of the building, are to be battened with battens, as shown in fig. 3, and nailed to the sills, plates, and each girt with one large nail through the center of the batten and through the joint of the boards.

**ROOFS.**—The roofs are all to be boarded with sound hemlock boards, laid with close joints, and well nailed. They are to be shingled with good, sound shingles, laid in courses showing 5½ inches to the weather, or in the same proportion if the shingles are over 18 inches in length. The ridges of the roof are to be finished with saddle-boards 6 inches wide, well nailed on.

**CORNICES.**—The cornices are to be made as shown in fig. 3. The ends of the rafters are to be planed up to the plate, and covered with matched plank, planed on the under side, and let into the rafters the thickness of the plank.

**WINDOWS AND DOORS.**—The windows and doors are to be made in every respect as shown in figs. 4, 6, and 7, and according to the description of those drawings. The windows in the school-room are to have 18 lights of

8×10" glass each; those of the porch and wood-house, 12 lights each; and those of the privy, 4 lights each. All the sash is to be 1½ inches thick. The glass is to be equal to the best cylinder glass, and is to be bedded and back-puttied, and the sash drawn. The front door, and the doors opening into the school-room, are to be 8×3 feet in size and 1½ inches thick. The doors to the wood-house are to be 7'×2' 8", and 1½ inches thick; and those to the privy, 7'×2' 4", and 1½ inches thick. The larger doors are to be hung with three butts each; and all the others with two butts each. The front door is to be furnished with a good rim-lock; all other outside doors, with bolts on the inside, and the passage doors, with mortice latches. All the locks and latches are to be furnished with mineral knobs.

FLOORS.—The floors are all to be laid of good, sound, planed and matched flooring, well blind-nailed, each plank to each joist. No floor-plank is to be used that is over 10 inches in width.

STEPS.—Good steps, made of wood, are to be made and set at the front door, wood-house and privy doors; also such as may be required are to be made and set between the school-room and wood-house.

CHIMNEYS.—The chimneys are to be built of well-burned brick, the tops made as shown in fig. 22. The chimneys are to be built so as to receive the smoke-pipes at least 16 inches below the ceilings. Iron thimbles are to be laid in the chimney to receive the stove or smoke-pipe.

VENTILATION.—Ventilating flues are to be made as

shown in fig. 8, and placed in the walls as shown in the plan. The two flues are to unite in the garret, and to open into the ventilating top. These flues are to be made perfectly tight, with no openings except through the registers, and at the top. Two registers are to be placed in each of the flues, one at the base, and one just below the ceiling of the room.

CEILING.—The porch, school-room, and back entry-way are to be ceiled with narrow, planed and matched boards, laid vertically. The strips are to be placed on the walls around the inside of the porch, upon which are to be put wardrobe-hooks, ten inches apart.

PLASTERING.—The plastering is to be made of three coats of good mortar, made of new lime and clean sand. It is to be even and level on the face, and in every respect put on in a workman-like manner.

PAINTING.—The paint is all to be made of pure lead and linseed-oil, with only coloring enough to give it the desired shade. All the wood-work that requires painting to have three good coats of paint.

DESIGN NO. II.

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THIS is the second of the series of cheap houses of wood, and is designed to accommodate forty pupils. By adding three feet to the length of the building, room will be afforded for an additional row of seats, and the room will accommodate forty-eight pupils. A building of this size is probably adapted to a greater number of our county districts than any other. The present school-houses, in a majority of the districts, have cost nearly or quite as much as the one here given, and yet they are vastly inferior to it in every element of beauty and comfort. We here have the double porch, affording ample room for entrances and clothes-rooms; a school-room sufficiently large to give a plentiful supply of pure air; everything necessary to the health and comfort of the pupils; and a building, without pretension, that is really an ornament to the landscape and an honor to the district.



## PLAN OF DESIGN NO. II.

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FIG. 10

- Main Building,  $30 \times 24$ , 13 feet posts.
- A A. Double Porch,  $16 \times 6$ .
- B. Wood-House,  $16 \times 12$ .
- C C. Privies, each  $4 \times 4$ .
- D. Passage,  $16 \times 4$ .
- E. Space in front of Desks, 10 feet wide.
- F. Space in rear of Desks, 3 feet wide.
- G G. Aisles, 2 feet wide.
- L L. Aisles,  $1\frac{1}{2}$  feet wide.
- H H. Desks,  $3\frac{1}{2}$  feet long.
- I I. Recitation Seats.
- J J. Blackboards.
- K. Case for Books and Apparatus.
- S. Stove.
- T. Table.
- V V. Ventilators.
- XX. Railing.

### DETAILS OF BUILDING.

All the details of building and finish in this design are like those of Design No. I.

# PLAN OF DESIGN NO. III. ---

FIG. 12.

- Main Building,  $33 \times 30'$ .
- Rear Building,  $18 \times 14'$ .
- A A. Double Porch,  $18 \times 18'$ .
- B. Wood-Room,  $18 \times 8'$ .
- D D. Back Entry-Ways, each  $9 \times 6'$ .
- E. Space in front of the Desks, 10 feet wide.
- F. Space in rear of the Desks, 3 feet wide.
- G G. Aisles,  $2\frac{1}{2}$  feet wide.
- L L. Aisles,  $1\frac{1}{2}$  feet wide.
- H H. Desks,  $3\frac{1}{2}$  feet long.
- I I. Recitation Seat.
- J J. Blackboards.
- K. Case for Books and Apparatus.
- S. Stove.
- T. Table.
- V V. Ventilators.

## DETAILS OF BUILDING.

The details of building and finish in this design are the same as in Design No. I.

## BILL OF MATERIALS AND LABOR FOR DESIGN NO. II.

### MAIN BUILDING AND PORCH.

#### MASONRY:

23 yards of Excavation, at 20 cents per yard.....	\$4 60
37 perch of Stone Wall, at \$1 25 per perch.....	46 25
500 Brick for Chimney, laid, at \$9 per M. ....	4 50
250 yards of Plastering, at 1s. 6d. per yard .....	46 87

#### CARPENTER AND JOINER WORK:

FRAME—2 Sills .....	30' long, 10×2" = 100 feet.
2 " .....	24' " 10×2" = 80 "
2 Plates .....	30' " 6×4" = 120 "
2 Beams .....	24' " 6×4" = 96 "
4 Posts .....	13' " 6×6" = 156 "
134 Studs, etc.....	13' " 4×2" = 1162 "
36 Joists. ....	15' " 10×2" = 900 "
23 Ceiling Joists .....	24' " 6×2" = 552 "
32 Rafters .....	17' " 5×3" = 680 "
48 Collar Beams.....	7' " 6×14" = 210 "

FRAME OF PORCH—1 Sill .....	16' long, 6×6" = 48 "
2 Sills .....	6' " 8×2" = 16 "
4 Joists .....	16' " 6×4" = 128 "
1 Beam .....	16' " 6×4" = 32 "
2 Plates .....	6' " 6×4" = 24 "
8 Rafters .....	12' " 5×3" = 120 "
22 Studs, etc.....	10' " 4×2" = 147 "
6 Posts for corners & doors.....	10' " 6×4" = 120 "

Total .....	4,691 "
4,691 feet of Lumber, at \$8 per M. ....	37 52
Framing and Raising the same, at \$7 per M. ....	32 83

## COUNTRY SCHOOL-HOUSES.

ROOFS—1,200' Roof Boards, at \$8 per M. ....	\$9 60
9,500 Shingles, at \$3 per M. ....	28 50
Boarding and Shingling, Labor and Nails, at \$1 25 per square	16 25
720' Plank, 14" thick for Cornice, at \$24 per M. ....	17 28
Nails and Labor in making the same, at \$24 per M. ....	17 28
WALLS—2,375' Siding, 14" thick, planed and matched, at \$18 per M. ....	42 75
Nails and Labor in laying the same, at \$10 per M. ....	23 75
1,580 linear feet Battens, laid, at \$10 per M. ....	15 80
FLOORS, ETC.—1,128' Flooring, 14" thick, planed and matched, at \$18 per M. ....	20 30
Nails and Labor in laying the same, at \$5 per M. ....	5 64
570 feet Wainscoting, planed and matched, at \$18 per M. ....	10 26
Nails and Labor in laying the same, at \$10 per M. ....	5 70
WINDOWS AND DOORS—6 Windows, 18 lights each, 8×10" glass, frames, sash, glass and casings complete, at \$4. ....	24 00
2 Windows for head-lights, 8 lights complete, at \$2 50. ....	5 00
5 Doors, 8×3' frames and casings complete, at \$7. ....	35 00

## WOOD-HOUSE.

## MASONRY:

4 perch of Stone for Piers, at \$1 25 .....	\$5 00
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## CARPENTER AND JOINER WORK:

FRAME—1 Sill .....	16' long, 6×6"=	48 feet.	
2 Sills .....	12' " 6×6"=	72 "	
4 Joists .....	16' " 6×4"=	128 "	
1 Beam .....	16' " 6×4"=	32 "	
2 Plates .....	12' " 6×4"=	48 "	
6 Posts .....	10' " 6×4"=	120 "	
4 Joists .....	16' " 6×2"=	64 "	
40 Studs, etc. ....	10' " 4×2"=	267 "	
16 Rafters .....	12' " 5×3"=	240 "	
Total .....		1,019 "	
1,019' Lumber, at \$8 per M. ....			8 15
Framing and Raising the same, at \$7 per M. ....			7 13

# BILL OF MATERIALS AND LABOR.

75

Roof—475' Roof Boards, at \$8 per M. ....	\$3 80
8,000 Shingles, at \$3 per M. ....	9 00
Boarding and Shingling, at \$1 25 per square. ....	5 93
200' Plank, 14" thick for cornice, at \$24 per M. ....	4 80
Nails and Labor upon same. ....	4 80
WALLS—500' Siding, 14" thick, planed and matched, at \$18 per M. ....	9 00
Nails and Labor in laying the same, at \$10 per M. ....	5 00
350' linear feet Battens, laid, at \$10 per M. ....	3 50
FLOOR, ETC.—128' Flooring, planed and matched, at \$18 per M. ..	2 30
Laying the same. ....	64
125' Boards for wainscot, at \$18 per M. ....	2 25
Laying the same, at \$10 per M. ....	1 25
WINDOW AND DOORS—1 Window, 12 lights, frames and finish, \$3. ....	3 00
3 Doors, 7×2' 8", frames, casings and trimmings, \$6. ....	18 00

## SUMMARY.

Main Building and Porch. ....	\$449 68
Wood-House. ....	93 55
Privy, as in Design No. I. ....	64 28
Total. ....	\$607 51

## SPECIFICATIONS.

The specifications for this design are the same as for Design No. I.

DESIGN NO. III.

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THIS is the third of the series, and is designed to accommodate sixty pupils. By adding three feet to the length of the building, seventy pupils can be accommodated. The general features of this design are similar to the preceding numbers of the series, except in the arrangement of the back entry-ways. As the pupils increase in number, the greater becomes the necessity of providing means for the entire separation of the sexes, except in the school-room. In this design the entry-way is separated from the wood-room, and divided into two parts by partitions, so that the two yards are entirely separated. The outer door of the wood-room opens into the boys' yard, and the inner door into the boys' hall. This arrangement will save the teacher much trouble, and will put an end entirely to many of the objections which have been urged against the education of the sexes together.



# BILL OF MATERIALS AND LABOR FOR DESIGN NO. III.

## MAIN BUILDING.

### MASONRY:

21 yards Excavation, at 20 cents .....	\$4 20
45 perch of Stone Wall, at \$1 25.....	56 25
600 Bricks, in chimney laid, at \$10 per M.....	6 00
216 yards Lathing and Plastering, at 20 cents .....	43 20

### CARPENTER AND JOINER WORK:

FRAME—2 Sills .....	33' long, 10×2" =	110 feet.
2 " .....	30' " 10×2" =	100 "
4 Posts .....	14' " 6×6" =	168 "
2 Beams .....	30' " 6×4" =	120 "
2 Plates .....	33' " 6×4" =	132 "
48 Joists .....	15' " 10×2" =	1200 "
25 Collar Beams .....	30' " 6×2" =	750 "
34 Rafters .....	20' " 5×3" =	850 "
200 Studs .....	14' " 4×2" =	1867 "
50 Braces for Collar Beams..	8' " 6×1½" =	250 "

Total ..... 5,547 "

5,547' Lumber, at \$8 per M..... \$44 37

Framing and Raising the same, at \$6 per M. .... 33 28

Roof—1,500' Roof Boards, at \$3 per M..... 12 00

11,000 Shingles, at \$3 per M. .... 33 00

Nails, Boarding and Shingling..... 18 75

600' Plank, 1½" thick for cornice, at \$24 per M. .... 14 40

Labor in making the same, at \$24 per M. .... 14 40

WALLS—2,200' Siding, 1½" thick, planed and matched, at \$18 per M.	\$39 60
Nails and Labor in laying the same, at \$10 per M. ....	22 00
1,400' linear feet Battens, dressed and laid, at \$10 per M. .	14 00
FLOORS, ETC.—1,400' Flooring, 1½" thick, planed and matched, at \$18 per M. ....	25 20
Nails and Labor in laying the same, at \$5 per M. ....	7 50
500' Wainscoting, dressed and laid .....	18 00
WINDOWS AND DOORS—6 Windows, frames, sash, glass and casings complete, at \$4. ....	24 00
4 Doors, 8×3' complete, at \$7 .....	28 00

## PORCH.

## MASONRY:

6 yards Excavation, at 20 cents per yard .....	\$1 20
5 perch of Stone Wall, at \$1 25 per perch .....	6 25
80 yards Lathing and Plastering, at 20 cents per yard .....	16 00

## CARPENTER AND JOINER WORK:

FRAME—1 Sill .....	18' long, 6×6"=	54 feet.	
2 Sills.....	9' " 6×6"=	54 "	
12 Joists .....	9' " 6×4"=	216 "	
2 Beams .....	18' " 6×6"=	108 "	
2 Plates .....	9' " 6×6"=	54 "	
12 Joists Ceiling .....	9' " 6×2"=	108 "	
4 Posts.....	10' " 6×4"=	80 "	
8 Studs .....	10' " 4×4"=	107 "	
20 " .....	10' " 4×2"=	133 "	
12 Rafters .....	13' " 5×3"=	195 "	
Total .....		1,109 "	
1,109' Lumber, at \$8 per M. ....			\$8 87
Framing and Raising the same, at \$6 per M. ....			6 65
ROOF—260' Roof Boards, at \$8 per M. ....			2 08
1,600 Shingles, at \$3 per M. ....			4 80
Boarding and Shingling .....			3 25
230' Plank, 1½" thick, at \$24 per M. ....			5 52
Nails and Labor in making the same .....			5 52

# BILL OF MATERIALS AND LABOR.

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WALLS—425' Siding, 1½" thick, at \$18 per M. ....	\$7 65
Nails and Labor in laying the same, at \$10 per M. ....	4 25
400' Battens, laid, at \$10 per M. ....	4 00
FLOORS, ETC.—160' Flooring, at \$18 per M. ....	2 88
Nails and Labor, at \$5 per M. ....	80
160' Wainscoting, at \$18 per M. ....	2 88
Nails and Labor, at \$10 ....	1 60
DOORS AND WINDOWS—2 Doors, frames and casings complete, at \$7	14 00
2 Windows, frames and glass complete, at \$3. ....	6 00
Front-door Steps, Materials and Labor ....	2 00

## WOOD-HOUSE.

### MASONRY:

6 yards Excavation, at 20 cents per yard .....	\$1 20
4½ perch Stone Wall, in stone piers, at \$1 25 per perch ..	5 62
60 yards Lathing and Plastering, at 20 cents per yard....	12 00

### CARPENTER AND JOINER WORK:

FRAME—2 Sills .....	18' long, 6×6"=	108 feet.
2 " .....	14' " 6×6"=	84 "
1 Sill .....	7' " 6×6"=	21 "
8 Floor Joists .....	9' " 6×4"=	144 "
8 Ceiling Joists .....	9' " 6×2"=	72 "
2 Beams .....	18' " 6×6"=	108 "
1 Beam .....	7' " 6×6"=	21 "
2 Plates .....	14' " 6×6"=	84 "
6 Posts .....	10' " 6×4"=	120 "
10 Studs for Doors, etc. ....	10' " 4×4"=	133 "
8 " .....	10' " 4×2"=	53 "
3 Girts .....	18' " 4×2"=	36 "
6 " .....	14' " 4×2"=	56 "
22 Rafters .....	13' " 5×3"=	357 "

Total..... 1,397 "

1,397' Lumber, at \$8 per M. ....	\$11 17
Framing and Raising the same, at \$6 per M. ....	8 88

## COUNTRY SCHOOL-HOUSES.

Roof—416' Roof Boards, at \$8 per M. ....	\$3 33
2,500 Shingles, at \$3 per M. ....	7 50
Boarding and Shingling .....	5 20
300' Plank, 1½" thick, planed and matched for cornice, at \$24 per M. ....	7 20
Nails and Labor in making the same .....	7 20
WALLS—620' Siding, 1½" thick, planed and matched, at \$18 per M. ....	11 16
Nails and Labor in laying the same, at \$10 per M. ....	6 20
600' Battens, linear measure, laid, at \$10 per M. ....	6 00
FLOORS, ETC.—135' matched Flooring, at \$18 per M. ....	2 43
Nails, and laying the same, at \$5 per M. ....	67
144' Wainscoting, at \$18 per M. ....	2 59
Labor and Nails in laying the same, at \$10 per M. ....	1 44
DOORS AND WINDOWS—3 Doors, frames and casings complete, at \$6	18 00
1 Window, complete. ....	3 00

## SUMMARY.

Main Building .....	\$458 15
Porch .....	106 20
Wood-House .....	120 20
Privy, as in Design No. I. ....	64 28
Total .....	<u>\$748 83</u>

## SPECIFICATIONS.

The specifications for this design are the same as for Design No. I.

DESIGN NO. IV.

---

THIS is the fourth of the series, and is designed to accommodate eighty-four pupils. By adding three feet to the length of the building, it will accommodate ninety-six. This building is particularly designed for those large county districts and smaller village schools where the attendance in winter is much greater than in summer. The arrangements of the wood-house and back halls are the same as in No. III. The porch is made sufficiently large to furnish the ordinary halls and clothes-rooms, and a large recitation-room in addition. In summer the school-room only need be occupied; but in winter, when the attendance is greatest, an additional teacher may be employed, and classes heard in the recitation-room. In a school of from seventy to one hundred pupils there should never be less than two teachers employed. True economy demands that the number of pupils to each teacher should not be too great, otherwise the teacher's time is so minutely subdivided as to be, in a great measure, frittered away.

# PLAN OF DESIGN NO. IV. ---

FIG. 14.

- Main Building,  $36 \times 36$ .
- Front Building,  $34 \times 10$ .
- Rear Building,  $18 \times 14$ .
- A A. Porches, each  $10 \times 8$ .
- B. Wood-Room,  $18 \times 8$ .
- C. Recitation-Room,  $18 \times 10$ .
- D. Back Entry-Way, each  $9 \times 6$ .
- E E. Space in front of Desks, 10 feet wide.
- F. Space in rear of Desks, 3 feet wide.
- G G. Aisles,  $1\frac{1}{2}$  feet wide.
- L. Center Aisle, 2 feet wide.
- P P. Aisles,  $1\frac{1}{2}$  feet wide.
- H H. Desks,  $3\frac{1}{2}$  feet long.
- I I. Recitation Seats.
- J J. Blackboards.
- K. Case for Books and Apparatus.
- S S. Stoves.
- T. Table.
- V V. Ventilators.



## DETAILS OF BUILDING.

---

THE details of this building are similar to those of No. I., except in the following particulars:

FIG. 15.

This is a plan and outside elevation of a double mullion window for Design No. IV. The frame should be constructed in the same manner as is described in fig. 4. Over all projecting window and door caps, a strip of tin or sheet-iron should be thoroughly nailed to the top of the cap and to the side of the building before the battens are laid. This, together with the paint, will prevent the water from finding its way into the joint behind the cap.

FIG. 16.

This is a plan, half size, showing a simple, cheap, and excellent method of constructing the frame and casings of a door, which may be applied to an outside or inside door, and to a brick wall or stud partition. S door-stud, R ground to receive the plastering, C door-jamb, E door-stop, D door, B B plastering, A A inside face-casing. This finish requires the wood-work to be put on after the plastering is laid. By omitting the facia A, the dotted line, F, shows the application of this finish to an outside door in a brick wall.

## DETAILS OF BUILDING.

FIG. 17.

THIS is a section of a window-frame, made in a similar manner to the door-frame in fig. 16 ; A, outside board or siding, B window-jamb, C window-sill, E inside sill, F inside jamb, g g facia, h h lath and plastering, m m ground to receive the plastering, O stud of the building frame, N girt, i i inside sash-stops, K parting strip between sash, L blind-stop, P P sash ; E and F and g g are to be put on after the plastering is finished.

In making and setting this window-frame, observe the directions for making and setting a door-frame under fig. 6.

A little attention to figs. 16 and 17 will show that this manner of finish, in many respects, is superior to any other that may be designed. It is solid, substantial, has few joints for the admission of moisture or cold air, and can be made with a less expenditure of labor and material than any other. This finish can be adopted for dwellings with equal advantage.

## BILL OF MATERIALS AND LABOR FOR DESIGN NO. IV.

### MAIN BUILDING.

#### MASONRY:

26 yards Excavation, at 20 cents per yard .....	\$5 20
52 perch Stone Wall, at \$1 25 per perch .....	65 00
600 Bricks, in chimney laid, at \$10 per M.....	6 00
286 yards Lathing and Plastering, at 20 cents per yard ...	57 20

#### CARPENTER AND JOINER WORK:

FRAME—2 Sills .....	38' long, 10×2" = 126 feet.	
2 " .....	36' " 10×2" = 120 "	
2 Plates .....	38' " 6×4" = 152 "	
4 Beams .....	36' " 6×6" = 432 "	
8 Posts .....	16' " 6×6" = 384 "	
160 Studs and Girts .....	16' " 4×2" = 1707 "	
60 Floor Joists .....	18' " 12×2" = 2160 "	
82 Ceiling Joists .....	12' " 6×2" = 984 "	
48 Rafters .....	24' " 5×3" = 1440 "	
24 Collar Beams .....	12' " 6×14" = 180 "	
Total .....	7,685 "	
7,685' Lumber, at \$8 per M. ....		\$61 48
Framing and Raising the same, at \$6 per M.....		46 11
ROOF—2,034' Roof Boards, at \$8 per M. ....		16 27
16,000 Shingles, at \$3 per M. ....		48 00
Nails, Boarding and Shingling, at \$1 25 per square.....		25 42
1,000' Plank, 14" thick for cornice, at \$24.....		24 00
Nails and Labor in laying the same .....		24 00
WALLS—2,730' Siding, 14" thick, planed and matched, at \$18 per M. ....		49 14
Nails and Labor in laying the same, at \$10 per M.....		27 30
2,200' Battens, linear measure, laid, at \$10 per M. ....		22 00

FLOORS, ETC.—1,300' Flooring, 1½" thick, planed and dressed, at \$18 per M. ....	\$23 40
Nails and Labor in laying the same, at \$5 per M. ....	6 50
600' Wainscoting, at \$18 per M. ....	10 80
Nails and Labor in laying the same, at \$10. ....	6 00
WINDOWS AND DOORS—6 Windows, each 18 lights, 10×8" glass, frames, casings, etc., complete, at \$4 ....	24 00
5 Doors, 8×3', frames and casings complete, at \$7. ....	35 00

## PORCH.

## MASONRY:

8 yards of Excavation, at 20 cents per yard .....	\$1 60
15 perch of Stone Wall, at \$1 25 per perch. ....	18 75
135 yards Lathing and Plastering, at 20 cents per yard ....	27 00

## FRAME—1 Sill .....34' long, 10×2"= 57 feet.

2 Sills ..... 8' "	10×2"= 27 "
2 Posts .....12' "	6×4"= 48 "
2 " .....10' "	6×4"= 40 "
1 Beam .....18' "	6×4"= 36 "
2 Beams ..... 8' "	6×4"= 32 "
4 Plates ..... 8' "	6×4"= 64 "
12 Rafters .....22' "	5×3"=330 "
40 Studs .....12' "	4×2"=320 "
24 Joists ..... 8' "	8×2"=256 "
24 Ceiling Joists ..... 8' "	6×2"=192 "

Total ..... 1,402 "

1,402' Lumber, at \$8 per M. ....	\$11 20
Framing and Raising the same, at \$6 per M. ....	8 40

ROOF—400' Roof Boards, at \$8 per M. ....	3 20
2,000 Shingles, at \$3 per M. ....	6 00
Nails, Boarding and Shingling .....	5 00
350' Plank, 1½" thick, for cornice, at \$24 per M. ....	8 40
Nails and Labor in laying the same .....	8 40

WALLS—650' Siding, 1½" thick, planed and matched, at \$18 per M. ....	11 70
Nails and Labor in laying the same, at \$10 per M. ....	6 50
600' Battens, linear measure, laid, at \$10 per M. ....	6 00

# BILL OF MATERIALS AND LABOR.

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FLOORS, ETC.—320' Flooring, 14" thick, planed and matched, at	
\$18 per M. ....	\$5 76
Nails and Labor in laying the same, at \$5 per M. ....	1 60
200' Wainscoting, at \$18 per M. ....	3 60
Nails and Labor in laying the same, at \$10. ....	2 00
WINDOWS AND DOORS—2 Windows, 12 lights each, complete, at \$3	
1 Mullion Window, complete ....	10 00
2 Doors, 8×3', complete, at \$7 each ....	14 00

## SUMMARY.

Main Building.....	\$582 82
Porch.....	165 11
Wood-House, as in No. III. ....	120 20
Privy, as in No. I. ....	64 28
Total .....	<u>\$932 41</u>

## SPECIFICATIONS.

The specifications for this building are the same as for Design No. I.

The wooden ventilators, registers and flues, made and inserted, as described in the "Details of Building" in No. I., will cost from \$10 to \$15 extra.

It will be seen that one of the heaviest items of cost in each of the foregoing Designs is the stonework for underpinning. In many country districts, stone can be furnished at little or no cost, and so a great saving can be effected upon the estimates given. The prices of labor and lumber, as here carried out, are both much higher than are usual in the country; and it is believed that in most places from 20 to 30 per cent. can be saved in the aggregate.

## CHAPTER III.

### CHEAP HOUSES OF BRICK.

THE Designs and Plans given in this chapter are similar to those given in the chapter upon "Cheap Houses of Wood," except in the materials used and the details of finish.

Brick houses, when well built, are much more durable than wood, and are therefore to be preferred; but it is very doubtful whether a poorly built brick house is as good as an ordinary house of wood. In using brick or stone for building purposes, care must always be taken to have a confined space of air around the inside of all the outer walls, by building hollow walls, or by lathing and plastering upon studs inside of the mason work. The reason is obvious; stone and brick are excellent conductors of heat, and if the wall is solid, the heat of the room is rapidly carried off, and the consumption of fuel is necessarily great.

The chimneys and ventilating flues are all carried up in the brick wall in all the houses built of this material. Care should be taken to make these as free from obstructions as possible, by giving them a smooth surface of plaster on the inside.



## DESIGN NO. V.

---

THIS Design, in plan and arrangement, corresponds with Design No. I. For plan, see fig. 2. For the smaller districts in the country, there can scarcely be a more chaste, simple and beautiful design than this. Such a building, surrounded by trees and rural scenery, would be attractive to both pupils and adults, and the generations who are there educated, in after years, would recall the early recollections of childhood with the highest emotions of pleasure.

### DETAILS OF BUILDING.

FIG. 19.

This figure represents an elevation of a portion of one corner of Design No. V. drawn to the scale of one inch to a foot; A is a portion of the stone wall, water-table, and brick wall. The water-table is set flush with the stone wall; the pilasters at the corners are set back one inch from the face of the water-table; and the main wall is set back three inches from the same, so as to give a two-inch projection to the brick dentils below the cornice; A B and C show the face of the brick wall; E E E show the dentils and pilasters; F is the wood cornice.

## DETAILS OF BUILDING.

FIG. 20.

THIS is an outside and inside elevation for a window, and also an elevation and sections of registers for ventilating flues. The method of constructing and setting the window-frames has already been described in fig. 4. The registers are made of wood in the same manner as ordinary window-blinds. A represents the shades closed. B is a section representing the shades open, and the manner of connecting the shades with the rod. C shows the manner of placing the register in a brick wall.

FIG. 21.

• This represents an outside and inside elevation of a door. The frame and casings are constructed as described in fig. 6.

FIG. 22.

THIS figure shows the method of laying brick walls, and of constructing chimney tops. A, section of brick wall, showing the method of constructing a hollow wall and of tying the courses of brick together. B is an elevation of the same. C and D are front and side elevations of chimney tops.

## BILL OF MATERIALS AND LABOR FOR DESIGN NO. V.

### MASONRY:

28 perch of Stone, for underpinning, laid, at \$1 25 per perch .....	\$35 00
18,000 Brick, for walls and chimneys, laid, at \$8 per M. ....	144 00
208 yards Lathing and Plastering, at 1s. 6d. per yard .....	39 00
75 " Plastering on brick walls, at 10 cents per yard..	7 50
4 cut-stone Window Sills, each 3' 3"×8" .....	4 00

### CARPENTER AND JOINER WORK:

FRAME—37 Joists .....12' long, 8×2"=592 feet.	
18 Ceiling Joists .....20' " 6×2"=360 "	
24 Rafters .....14' " 5×3"=420 "	
12 Bond .....12' " 4×2"= 96 "	
2 Plates .....24' " 6×2"= 48 "	
Total .....	1,516 "
1,516' Lumber, at \$8 per M. ....	\$12 13
Framing and Raising, at \$6 per M. ....	9 10
ROOF—830' Roof Boards, at \$8 per M. ....	6 64
6,000 Shingles, at \$3 per M. ....	18 00
Nails and Labor, laying the same, at \$1 25 per square ...	10 38
500' 14" Plank, in cornice, at \$24 per M. ....	12 00
Labor upon Cornice. ....	12 00
FLOORS—600' Flooring, 14" thick, planed and matched, at \$18 per M. ....	10 80
Nails and Labor in laying the same, at \$5. ....	2 00
WINDOWS AND DOORS—4 Windows, frames, sash, glass, etc., at \$5 each .....	20 00
2 Doors, frames, cases and trimmings 8'×3' at \$8 each ..	16 00

## PORCH.

## MASONRY.

4 perch of Stone .....	\$5 00
2,400 Brick .....	19 20
10 yards Lathing and Plastering, at 1s. 6d. per yard .....	1 87
10 " Plastering upon brick wall .....	1 00
Cut-stone Threshold for front door, 4'×16" .....	2 00

## CARPENTER AND JOINER WORK:

FRAME—2 Plates .....	4' long, 6×2"= 8 feet.	
8 Rafters .....	4' " 4×2"=21 "	
4 Joists. ....	6' " 6×2"=24 "	
4 Ceiling Joists. ....	6' " 6×2"=24 "	
Total .....	77 "	
77' Lumber, at \$8 per M. ....		62
Framing the same .....		46
ROOF—100' Roof Boards .....		1 00
750 Shingles, laid .....		3 50
Cornice, Labor and Materials .....		3 00
WINDOW AND DOOR—1 Window, 12 lights, complete .....		4 00
1 Door, 8'×3', complete .....		8 00

## WOOD-HOUSE.

## MASONRY:

3 perch of Stone Wall .....	\$3 75
4,300 Brick, laid, at \$8 per M. ....	34 40
12 yards Lathing and Plastering, at 1s. 6d. per yard .....	2 25
1 cut-stone Window-Sill, 3'×8" .....	1 00
1 " Window-Cap, 3'×8" .....	1 00

## CARPENTER AND JOINER WORK:

FRAME—4 Joists .....	12' long, 8×2"= 64 feet.	
2 Plates .....	12' " 6×2"= 24 "	
14 Rafters .....	8' " 5×3"=140 "	
7 Collar Beams .....	12' " 4×2"= 56 "	
Total .....	284 "	
284' Lumber, at \$8 per M. ....		2 27
Framing and Raising the same, at \$6 per M. ....		1 70

# BILL OF MATERIALS AND LABOR.

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Roof—216' Roof Boards, at \$8 per M. ....	\$1 72
1,500 Shingles, at \$3 per M. ....	4 50
Boarding and Shingling .....	2 70
Cornice, Labor and Materials. ....	9 00
Window, Doors, ETC.—1 Window, complete, 12 lights. ....	4 00
3 Doors, complete, each 7'×2' 8", at \$7. ....	21 00
100' 2-inch Plank for flooring, laid .....	1 25

## PRIVY.

### MASONRY:

18 yards Excavation, at 20 cents per yard .....	\$3 60
12 perch of Stone Wall, at \$1 25 per perch .....	15 00
2,800 Brick, at \$8 per M. ....	22 40
4 yards Lathing and Plastering, at 1s. 6d. per yard .....	75
12 " Plastering on brick walls, at 10 cents per yard ..	1 20
2 cut-stone Door-Caps, 3'×8" .....	2 00
2 " Door-Sills, 3'×16" .....	2 00
2 " Window-Caps, 2'×8" .....	2 00
2 " Window-Sills, 2'×8" .....	2 00

### CARPENTER AND JOINER WORK:

#### FRAME AND ROOF—18 Joists and Rafters, 10' long, 4×2'=120 feet.

120' Lumber, framed and raised .....	\$1 50
130' Roof Boards, laid .....	1 50
1,000 Shingles, laid .....	4 00
Cornice, Labor and Materials .....	4 00
Doors, Windows, ETC.—2 Doors, complete, 7'×2' 4", at \$6 .....	12 00
2 Windows, complete, 4 lights each, at \$3 .....	6 00
50' Flooring, laid .....	1 00

## SUMMARY.

Main Building .....	\$359 55
Porch .....	49 65
Wood-House .....	90 54
Privy .....	80 95
Total .....	\$580 69

SPECIFICATIONS.

---

EXCAVATION.—Trenches are to be dug of sufficient depth to commence the walls below the action of frost. The privy vault is to be six feet deep. All the earth is to be properly leveled and graded around and from the walls when the walls are finished.

FOUNDATION WALLS.—The foundation walls are all to be built of good wall stone, and well laid in good mortar made of fresh-burned lime and clean sand. The walls are all to commence below the action of frost, and are to have a footing-course under them at least 20 inches wide and 12 inches thick, laid with care and well grouted. All the walls are to show 18 inches of facia above the grade. The faced walls are to project three inches, and are to be covered with a cut-stone water-table, set flush with the stone walls so as to receive the brick walls and pilasters, as represented in fig. 19.

BRICK WALLS.—The brick walls are all to be built of well-burned brick laid in good mortar, made of fresh-burned lime and clean sand. The walls are to be built as shown in fig. 22. All the outside walls are to be finished with flush face and struck joints. The dentils



for the cornice are to be built as described under fig. 19. The gable-end walls are to be eight-inch solid walls. The walls are to be built sufficiently high to leave the school-room 13 feet high in the clear, and the porch and wood-house 9 feet in the clear.

CHIMNEYS.—The chimney tops are to be built as shown in fig. 22. The flues are to be smoothly plastered. An iron thimble is to be set in the chimney at least 16 inches below the ceiling to receive the smoke-pipe.

VENTILATION.—Ventilating flues are to be carried up with the walls and plastered. They are to unite in one in the attic, and open into a wooden ventilating top, as described in fig. 8.

ROOFS.—The roofs are to be boarded and shingled, as specified in Design No. I.

CORNICE.—The roof-boards are to project over the gable-end walls the same distance that the rafters project over the side walls, and are to be furnished with furring the same size as the rafters. The furring and rafters are to be ceiled on the under side with planed and matched boards, and the other members of the cornice put on in the usual manner. The projection and form of the cornice are to be as shown in fig. 19.

DOORS.—The outside doors are to be finished as shown in fig. 21. The casings and frames are to be made as shown and described in fig. 16. The outside and inside doors are to be of the thickness, and hung and trimmed, as specified in Design No. I.

WINDOWS.—The windows are to be made with circular

heads, as represented in fig. 20. The frames and casings are to be made as shown in figs. 36 and 37. The materials and work in sash and glass are to be as specified for Design No. I.

INSIDE FINISH.—The joists, rafters, studs and all other timbering; the floors, ceilings and all other wood-work, are to be made, finished and painted, as specified for Design No. I. The plastering upon the brick walls is to be of two coats; the finish and the plastering upon the ceiling to be as specified in Design No. I. The outside steps, door-sills, window-sills, and water-table, are to be of cut stone.

DESIGN NO. VI.

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IN plan and general arrangement, this design is like Design No. II. For plan, see fig. 10. The blankness of the walls of this building has been relieved by pilasters, and a cupola has been added for a bell-tower. This cupola may be left off, if the builder chooses, and in that case the finish would be like No. V. The ventilating flues here are carried up with the walls of the cupola.

## DETAILS OF BUILDING.

All the details of this building are like those of No. V., with the exception of the windows, which are as represented by fig. 24. These windows have square heads, and are each furnished with 12 lights, of  $18 \times 7$ " glass.

## BILL OF MATERIALS AND LABOR FOR DESIGN NO. VI.

### MAIN BUILDING AND PORCH.

#### MASONRY.

23 yards Excavation, at 20 cents per yard .....	\$4 60
37 perch of Stone Wall, at \$1 25 per perch .....	46 25
21,500 Brick, laid, at \$8 per M. ....	172 00
90 yards Lathing and Plastering, at 1s. 6d. per yard .....	16 87
138 " Plastering on brick walls, at 10 cents per yard ..	13 80

CUT STONE—2 Front-door Sills, 4'×16" .....	4 00
2 Front-door Caps, 4'×8" .....	3 00
6 Window-Sills, 3' 3"×8" .....	6 00
6 " Caps, 3' 4"×8" .....	6 00
2 " Sills, 2'×7" .....	1 50
2 " Caps, 2'×7" .....	1 50

#### CARPENTER AND JOINER WORK:

FRAME—36 Joists .....	15' long, 10×2" =900 feet.
23 Ceiling Joists .....	24' " 6×2" =552 "
48 Collar Beams .....	7' " 6×14" =210 "
32 Rafters .....	17' " 5×3" =680 "
FRAME OF PORCH—4 Joists .....	16' " 10×2" =107 "
4 Beams .....	16' " 6×2" =64 "
8 Rafters .....	12' " 5×3" =120 "

Total .....	2,633 "
2,633' Lumber, at \$8 per M. ....	\$21 06
Framing and Raising the same, at \$6 per M. ....	15 79

# BILL OF MATERIALS AND LABOR.

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Roof—1,200' Roof Boards, at \$8 per M. ....	9 60
9,500 Shingles, at \$3 per M. ....	28 50
Nails and Labor, Boarding and Shingling .....	15 00
700' Plank, 14" thick for cornice, at \$24 per M. ....	16 80
Nails and Labor in making the same .....	16 80

FLOORS, ETC.—1,128' Flooring, 14" thick, planed and matched, at \$18 per M. ....	20 30
Nails and Labor in laying the same, at \$5 per M. ....	5 62
570' Wainscoting, laid .....	22 80

WINDOWS AND DOORS—6 Windows, sash, glass and frames, at \$5..	30 00
2 Windows, sash, glass and frames for porch, at \$3 .....	6 00
5 Doors and Frames, complete, 8'×3', at \$7 .....	35 00

## WOOD-HOUSE.

### MASONRY:

7 yards Excavation, at 20 cents per yard .....	\$1 40
10 perch of Stone Wall, at \$1 25 per perch.....	12 50
6,000 Brick, laid, at \$8 per M. ....	48 00
1 cut-stone Window-Sill, 3'×8" .....	1 00
1 " Window-Cap, 3'×8".....	1 00
30 yards Plastering on brick wall, at 10 cents per yard ...	3 00

### CARPENTER AND JOINER WORK:

FRAME—4 Joists .....16' long, 10×2"= 107 feet.	
4 Beams .....16' " 6×2"= 64 "	
16 Rafters .....12' " 5×3"= 240 "	
8 Plates, etc. ....12' " 6×2"= 96 "	
Total .....	507 "
507' Lumber, at \$8 per M. ....	\$4 05
Framing and Raising the same, at \$6 per M.....	3 04

Roof—475' Roof Boards.....	3 80
3,000 Shingles.....	9 00
Boarding and Shingling .....	5 93
Cornice, Labor and Materials... ..	10 00

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WINDOWS, DOORS, ETC.—1 Window, complete .....	4 00
3 Doors, complete, each 7'×2' 8" .....	12 00
125' Wainscoting .....	5 00
128' Flooring, laid .....	2 50

## SUMMARY.

Main Building and Porch .....	\$518 79
Wood-House .....	126 22
Privy, as in Design No. V. ....	80 95
Total .....	<u>\$725 96</u>

## SPECIFICATIONS.

The specifications for this design are the same as for Design No. VI.

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SUGGESTIONS.—A cupola, similar to the one given in this design, may be added to either of the cheap designs at a very trifling expense. It adds much to the beauty of the building, and, more than any other one thing, is a distinctive feature of school architecture. The cupola should never be built so as to appear as a mere appendage to the roof, but it should rest upon supports, which visibly extend to the ground. Besides the improvement to the appearance of the building, the cupola forms a tower for a bell; and a bell should be considered an indispensable article of apparatus for every school-house. By means of a bell, which can be heard at a distance, a much greater promptness in the attendance of pupils can be secured than in any other manner.



## DESIGN NO. VII.

---

IN general arrangement, this Design corresponds with Design No. III. For plan, see fig. 12. It is exceedingly simple in structure, but it has the appearance of strength and durability. In the midst of a yard, and surrounded by trees, this building would present a fine appearance, and, in every respect, would be much better than many more elaborate and costly houses.

## DETAILS OF BUILDING.

FIG. 26.

This figure represents the plan, outside elevation, and vertical section of a window. A plan, showing the window-sill and relative position of the horizontal pieces. B elevation, C vertical section.

FIG. 27.

This figure represents the inside elevation of the same window, and a section of the frame and casing. A outside casing, E jamb, G inside casing, F sash-stop, D parting-strip, B blind-stop. A cheaper and better style of finish for window-frames is described under figs. 36 and 37.

## DETAILS OF BUILDING.

FIG. 28.

THIS figure is an elevation and vertical section of an outside door. The threshold is shown at A and the portion of the joist and floor against it at B. The jamb, door-step, and inside casings are shown at C.

The brick finish to this, and to all similar doors, is made by turning the brick in two arches, each the four-inch width of the brick; the upper course projecting one inch. One brick, cut to the right length, and projecting one half inch more than the arch, will form the corbel, as shown at D.

FIG. 29.

This figure represents an inside elevation, and a section of the same door. A inside casing, B outside casing. C jamb, D door, E stop.

FIG. 30.

This figure shows the manner of supporting the roof, and gives an elevation of two sides of a chimney. A roof support, B side of chimney, C end of chimney.

## BILL OF MATERIALS AND LABOR FOR DESIGN NO. VII.

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### MAIN BUILDING.

#### MASONRY:

20 yards Excavation, at 20 cents per yard .....	\$4 00
35 perch of Stone Wall, at \$1 25 per perch .....	43 75
31,500 Brick, in walls and chimney laid, at \$8 per M.....	252 00
216 yards Lathing and Plastering, at 20 cents per yard ...	43 20
139 " Plastering on brick walls, at 10 cents per yard..	13 90
12 Window Doors and Caps, 3' 4"×8" .....	12 00

#### CARPENTER AND JOINER WORK:

FRAME—48 Joists .....	15' long, 10×2" = 1,200 feet.
25 Collar Beams .....	30' " 6×2" = 750 "
34 Rafters .....	20' " 5×3" = 850 "
51 Collar Braces. ....	8' " 6×1½" = 255 "
Total .....	3,055 "
3,055' Lumber, at \$8 per M.....	\$24 44
Framing and Raising the same, at \$6 per M.....	18 33
ROOF—1,500' Roof Boards, at \$8 per M.....	12 00
11,000 Shingles, at \$3 per M. ....	33 00
Nails, Boarding and Shingling.....	18 75
600' Plank, for cornice, 1½" thick at \$24 .....	14 40
Nails and Labor in making the same .....	14 40
FLOORS, ETC.—1,400' matched Flooring, 1½" thick, at \$18 per M...	25 20
Nails and Labor in laying the same, at \$5 per M. ....	7 20
500' Wainscoting, laid, at \$30 per M.....	15 00
WINDOWS AND DOORS—6 Windows, 18 lights each, complete, at \$5	30 00
4 Doors, 8×3', complete, at \$8.....	32 00

## PORCH.

## MASONRY :

6 yards of Excavation, at 20 cents per yard .....	\$1 20
5 perch of Stone Wall, at \$1 25 per perch .....	6 25
5,000 Brick, at \$8 per M. ....	40 00
12 yards Lathing and Plastering, at 20 cents per yard ....	2 40
17 " Plastering on brick walls, at 10 cents per yard...	1 70
3 Door-Sills, 3' 8" long, 16×8" .....	3 00
4 Window Sills and Caps, 2' 6" long, 4×6" .....	4 00

## CARPENTER AND JOINER WORK :

FRAME—4 Joists .....18' long, 10×2"=120 feet.	
4 Ceiling Joists .....18' " 6×2"= 72 "	
10 Rafters .....13' " 5×3"=162 "	
Total ..... 354 "	
354' Lumber, at \$8 per M. ....	\$2 83
Framing and Raising the same, at \$6 per M.....	2 12
Roof—300' Roof Boards, at \$8 per M. ....	2 40
1,500 Shingles, at \$3 per M. ....	4 50
Nails, Boarding and Shingling .....	1 00
200' Plank, for cornice, 14" thick, at \$24 per M. ....	4 80
Nails and making the same .....	4 80
Floors, etc.—200' matched Flooring, 14" thick, at \$18 per M....	3 60
Nails and laying the same, at \$5 per M. ....	1 00
270' Wainscoting, at \$30 per M. ....	8 10
Outside Steps .....	8 00
Windows and Doors—2 Windows, 12 lights each, complete ....	8 00
2 Doors, 8×3', complete .....	16 00

## WOOD-HOUSE.

## MASONRY :

7 yards Excavation, at 20 cents per yard .....	\$1 40
14 perch Stone Wall, at \$1 25 per perch .....	17 50
7,000 Brick, at \$8 per M. ....	56 00
35 yards Lathing and Plastering, at 20 cents per yard ....	7 00
14 " Plastering on brick walls, at 10 cents per yard ...	1 40
2 Window Sills and Caps, 2' 6" long, 4×6" .....	1 50

# BILL OF MATERIALS AND LABOR.

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## CARPENTER AND JOINER WORK:

FRAME—3 Joists .....	18' long, $10 \times 2'' = 90$ feet.	
3 " .....	18' " $6 \times 2'' = 54$ "	
14 Rafters .....	13' " $5 \times 3'' \times 227$ "	
Total .....	371 "	
371' Lumber, at \$8 per M. ....		\$2 96
Framing and Raising the same, at \$6 per M. ....		2 22
Roof—400' Roof Boards, at \$8 per M. ....		3 20
2,500 Shingles, at \$3 per M. ....		7 50
Boarding and Shingling .....		4 00
200' Plank, for cornice, $1\frac{1}{4}''$ thick, at \$24 per M. ....		4 80
Nails and Labor in making the same .....		4 80
FLOORS, ETC.—144' Flooring, at \$18 per M. ....		2 59
Nails and laying the same, at \$5 per M. ....		72
242' Wainscoting, at \$30 per M. ....		7 36
WINDOW AND DOORS—1 Window, complete, 12 lights .....		4 00
3 Doors, complete, at \$7 .....		21 00
Outside Steps .....		6 00

## SUMMARY.

Main Building .....	\$613 57
Porch .....	125 60
Wood-House .....	155 95
Privy, as in No. VI. ....	80 95
Total .....	\$976 07

## SPECIFICATIONS.

The specifications for this design are the same as for Design No. VI.

DESIGN NO. VIII.

---

IN general arrangements this Design is like Design No. IV. For plan, see fig. 14. This building is well proportioned and symmetrical, but simple, plain and unpretending. While it possesses every requisite essential to a good school-house, its simplicity is pushed to the very verge of plainness, and the cost is within corresponding limits. It illustrates the facts that cheapness is not incompatible with the exercise of good taste, and that plainness does not necessarily imply deformity. The windows and doors are arched at the top to save the expense of cut stone, and every part is constructed with reference to the most rigid economy. At the smallest outlay of cost, we have a building which, in appearance, would be a credit to any district, and, at the same time, in size, construction and arrangement, is admirably adapted to the general purposes of a school-room.



## DETAILS OF BUILDING.

FIG. 32.

THIS figure is an elevation of the upper corner of Design No. VIII., showing the manner of constructing the cornice, and the method of uniting the cornice of the porch with the main building. The walls are set on to the water-table, as in fig. 19. A shows the upper portion of the wall and cornice of the front part in its place against the main building. B is a portion of the wall and cornice of the main building. C is the buttress, showing its projection to receive the wood cornice, and also the brick cornice, as shown by the dotted lines. D is the wood coping.

FIG. 33.

THIS figure contains an outside and inside elevation of a window, and an outside elevation of a porch window. The method of constructing these window-frames has already been described under fig. 4. See, also, figs. 36 and 37.

## DETAILS OF BUILDING.

FIG. 34.

THIS figure represents the outside elevation and section of a double mullion window for the front of Design No. VIII. The method of constructing and inserting it in the walls has already been described.

FIG. 35.

THIS is an inside elevation and section of the same window. B face casing, C sill.

FIG. 36.

THIS figure is a plan and inside elevation of the same window as the last, finished in a manner to greatly economize both labor and materials. The difficulty in finishing circular windows arises from the waste of materials in cutting the circular work, and the amount of labor required to do the same. With this style of finish the window will show on the outside, as in fig. 34, while the only circular work required in the finish is the spandril in the sash at A, the edge of the jamb on the outside, and the blind stop. All circular windows can be finished in this manner, and a great saving of expense thereby effected.

## DETAILS OF BUILDING.

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FIG. 37.

THIS figure shows a section of all the members of the frame of a window finished in the manner indicated in fig. 35, half of the full size. A stone sill, B brick wall, C wood sill, F inside sill, I I plastering, G G facia to cover joints between plastering and jamb, or sill; D and E jamb, K K sash-stops, L parting between sash, M blind-stop. The portions E G and F G are to be put on after the plastering is done. This style of finish is similar to that described under fig. 17, and is much more simple and economical than the ordinary style. It has but few joints, and hence there is little opportunity for the admission of cold air. The facia, G G, not only cover the joints, but prevent the plaster from cracking off. This style of frame can be applied to all windows in brick buildings.

FIG. 38.

This figure represents the outside and inside elevation of an outside door. The general description of figs. 28 and 29 will apply to this. A fine, economical style of finish is described under fig. 16.

# BILL OF MATERIALS AND LABOR FOR DESIGN NO. VIII.

## MAIN BUILDING.

### MASONRY:

52 yards Excavation, at 20 cents .....	\$10 40
71 perch of Stone Wall, at \$1 25.....	88 75
35,000 Brick, laid, at \$8 per M.....	280 00
144 yards Lathing and Plastering, at 20 cents .....	28 80
160 " Plastering on brick walls, at 10 cents .....	16 00
CUT STONE—6 Window-Sills, 3' 4"×8" .....	6 00

### CARPENTER AND JOINER WORK:

FRAME—60 Floor Joists .....18' long, 12×2" =2,160 feet.	
82 Ceiling " .....12' " 6×2" = 984 "	
48 Rafters.....24' " 5×3" =1,440 "	
24 Collar Beams .....12' " 6×14" = 180 "	
2 Plates.....38' " 8×2" = 101 "	
Total.....	4,865 "
4,865' Lumber, at \$8 per M. ....	\$38 92
Framing and Raising the same, at \$6 per M.....	29 19
ROOF—2,000' Roof Boards, at \$8 per M. ....	16 00
12,000 Shingles, at \$3 per M. ....	36 00
Nails and Labor in laying the same.....	20 00
1,000' Plank, 14" thick, for cornice, at \$24 per M.....	24 00
Nails and Labor in making cornice.....	24 00
FLOORS, ETC.—1,836' matched Flooring, at \$18 per M.....	33 04
Labor and Nails, at \$5 .....	9 18
600' Wainscoting, laid, at \$30 per M.....	18 00

# BILL OF MATERIALS AND LABOR.

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WINDOWS AND DOOR—6 Windows, 18 lights, 10×8" glass, frames, sash, glass and casings complete, at \$5 .....	30 00
5 Doors, 8'×3', complete, at \$7 .....	35 00

## PORCH.

### MASONRY:

5 yards Excavation, at 20 cents per yard.....	\$1 00
15 perch of Stone Wall, at \$1 25 per perch .....	18 75
9,000 Brick, laid, at \$8 per M. ....	72 00
52 yards Lathing and Plastering, at 20 cents per yard. ....	10 40
59 " Plastering on brick walls, at 10 cents per yard ....	5 90
OUT STONE—2 Door-Sills, 4'×16".....	4 00
2 Window-Sills, 2' 6"×8" .....	1 50
2 " Caps, 2' 6"×8".....	1 50
1 Mullion Window-Sill, 5' 6"×8".....	2 00

### CARPENTER AND JOINER WORK:

FRAME—24 Joists .....	8' long, 8×2"=256 feet.
24 Ceiling Joists.....	8' " 6×2"=192 "
12 Rafters .....	22' " 5×3"=330 "
4 Plates .....	8' " 6×4"= 64 "
Total .....	842 "
842' Lumber, at \$8 per M. ....	\$6 73
Framing and Raising the same, at \$6 per M. ....	5 05
ROOF—450' Roof Boards, at \$8 per M. ....	3 60
2,600 Shingles, at \$3 per M. ....	7 80
Nails, Boarding and Shingling .....	4 50
275' Plank, for cornice, at \$24 per M. ....	6 60
Nails and Labor in making the same .....	6 60
FLOOR, ETC.—360' matched Flooring, at \$18 per M. ....	6 48
Nails and laying the same, at \$5 .....	1 80
400' Wainscoting, laid, at \$30 per M. ....	12 00
WINDOWS AND DOORS—2 Doors, 8×3' frames, casings and trim- mings complete, at \$7.....	14 00
1 Mullion Window, all complete.....	12 00
2 Windows, 12 lights, complete, at \$4.....	8 00

## SUMMARY.

Main Building.....	\$743 28
Porch.....	211 21
Wood-House, as in No. VII. ....	155 95
Privy, as in No. V. ....	80 95
Total .....	<u>\$1,191 39</u>

## SPECIFICATIONS.

The specifications for this building are the same as for Design No. V.

The flues and ventilator tops, in each of the brick buildings, will cost from \$7 to \$10 extra.



## CHAPTER IV.

### HOUSES OF VARIOUS STRUCTURE.

#### DESIGN NO. IX.

THIS Design represents an octagon with gables. In some sections of country the octagonal form of building is decidedly popular, chiefly on account of economy. The same amount of walls and roof in an octagon will inclose a greater area than any rectangular form. The space inclosed is also very compact, and easily lighted. The greatest objection to this form of building is its unsightly appearance; and, indeed, an octagon with a flat hip-roof, no balustrade, and no projections to relieve the dead monotony of the walls, has about as much architectural beauty as a joint of stove-pipe set upright. In the design here given this objection has been obviated, by making four gables in the roof, and by adding a cupola and two porches. With these improvements, the octagon becomes a fine form for a school-house, and a picturesque feature of the landscape.

### EXPLANATION OF PLAN.

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FIG. 40.

Building, 12 feet sides.

A A. Porches, each  $6' \times 4'$ .

B. Space in front of desks, 10 feet.

C. Space in rear of desks, 4 feet.

D D. Side Aisles,  $2\frac{1}{2}$  feet wide.

E E. Aisles,  $1\frac{1}{2}$  feet wide.

F F. Desks,  $3\frac{1}{2}$  feet long

G G. Recitation Seat.

H H. Blackboards.

I I. Doors to back Entry-Way.

K K. Blind Windows.

The spaces in front are provided with blinds so as to resemble windows, but the windows are left out to afford more room for blackboard, and so that the pupils will not be obliged to face the light. A wing may be added to the rear of the building for a wood-house, without destroying its symmetry. A better way, perhaps, would be to excavate the basement for a wood-room. Estimated cost, \$450.

## EXPLANATION OF PLAN.

---

FIG. 41.

THIS figure represents the plan of an octagon, with 18 feet sides, and is designed to accommodate from 60 to 80 pupils. It is provided with a fine recitation-room, so that two teachers may be employed, when necessary.

A A. Porches, each  $5' \times 8'$ .

B. Space in front of desks, 10 feet wide.

C. Recitation-Room,  $18 \times 12$ .

D D. Back Entry-Ways.

E. Space in rear of desks, 3 feet wide.

F F. Side Aisles,  $2\frac{1}{2}$  feet wide.

G G. Aisles,  $1\frac{1}{2}$  feet wide.

H H. Blackboards.

I I. Recitation Seats.

Like Design No. IV., this building is specially adapted to such districts as need an extra teacher during a portion of the year. Estimated cost, \$600.

A great variety of octagonal buildings, making good school-rooms, can easily be constructed; but in partitioning such buildings, the extra expense of the internal finish will fully counterbalance the economy in the construction of the walls and roof, and generally the rectangular forms will be preferred.

## DESIGN NO. X.

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THIS Design is well adapted to a small rural district, where there are no trees in the immediate vicinity of the school-house. The wide roofs and gables give it a cool, shady, home-like appearance which is at once attractive, and in harmony with the objects of its construction. A wing for a wood-room may be added to the rear, without marring the harmony of the design. This kind of structure is admirably adapted to exposed sunny situations. Estimated cost \$450.

FIG. 43.

Building, 36 × 24.

- A A. Porches, each 8 × 4.
- B. Space in front of the desks, 8 feet wide.
- C. Space in rear of the desks, 3 feet wide.
- D D. Side Aisles, 2½ feet wide.
- E. Center Aisle, 2 feet wide.
- F F. Aisles, 1½ feet wide.
- G G. Desks, 3½ feet each.
- H H. Recitation Seats.
- I I. Doors to back yard and wood-house.
- J J. Blackboards.

DESIGN NO. XI.

---

THIS is an admirable design for a large country district, or for a small village. Without any pretense, it is a model of chasteness and symmetry. It is rendered stately and imposing by adding the second story to the central portion, and by the exact balance of parts. It is peculiarly adapted to a highly cultivated and thickly settled country, and should be partially surrounded by trees and shrubbery. In such a situation it would contrast favorably with the highly ornamental and elaborately finished country seats around. Its finely proportioned but exceedingly plain exterior, would be attractive from its very simplicity, while at the same time it would much better harmonize with its every-day uses, than though profusely covered with costly ornaments. The internal arrangements are such that one or two teachers may be employed as occasion requires. Estimated cost, \$800.

## EXPLANATION OF PLAN.

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FIG. 45.

- Main Room,  $32 \times 22$  inside.
- A. Porch,  $18 \times 5$  outside.
- B. Wood-Room and Staircase,  $18 \times 16$ .
- C C. Back Passages, each  $4 \times 4$ .
- D. Staircase.
- E. Space in front of Desks, 9 feet wide.
- F F. Side Aisles, 2 feet wide.
- G. Center Aisle,  $1\frac{1}{2}$  feet wide.
- H H. Aisles,  $1\frac{1}{2}$  feet wide.
- I I. Recitation Seat.
- J J. Blackboards.
- K K. Desks,  $3\frac{1}{2}$  feet long.
- L. Staircase Landing.
- M. Recitation or School-Room,  $16 \times 30$ .

The lower story contains the principal school-room, and the room above may be used a recitation-room or an independent school-room. It is so arranged that the pupils can pass from the upper room into the main school-room, or directly out of doors. In winter, the smaller pupils might form a school by themselves in the upper room, leaving the principal school-room entirely to the more advanced pupils, an arrangement which would tend greatly to increase the efficiency of the school.



## CHAPTER V.

### UNION SCHOOL-HOUSES.

THE most obvious and glaring faults of the common schools of this country arise from the want of a well-organized system of instruction. It is obvious to every one that a course of study adapted to the capacity of the more advanced pupils can not be successfully pursued by the primary classes ; and it ought to be just as obvious that the systems of discipline, and the methods of imparting instruction, in the two cases, should be different. Educators, in this country and in Europe, have long since demonstrated that certain fixed principles, both of instruction and discipline, are adapted to the different ages and developments of pupils ; and they have shown that a true philosophical system of education will recognize these differences, and apply the principles in the arrangement of schools, and in the construction of school-houses.

When pupils of all ages and states of advancement are brought together into one room for the purpose of education, as in our ordinary district schools, natural laws are violated, and, in consequence, the work of instruction is very imperfectly performed. The quietness

and attention to study, necessary to the progress and highest success of an advanced school, can not be enforced in primary classes without seriously injuring the pupils, both physically and mentally; and, conversely, the frequent change of position, and noise incident thereon, indispensable to primary classes, can not be permitted in a more advanced school without a relaxation of discipline and an interference with study incompatible with its highest interests.

Again, the kind of instruction and the methods of imparting it, are essentially different in the two cases. With primary classes the instruction should be confined principally to facts, and the very first elements of science, all presented synthetically, and made interesting by familiar illustrations which appeal immediately to the senses. In the higher schools this course is entirely changed. The facts which form the basis of all science have been learned, and the expanding minds instinctively seek generalizations and principles. Now the instructor must plunge into the depths of his subject and elucidate its general laws. Now he must become simply a guide, to the youthful mind at every step, teaching it more and more to rely upon its own mental processes. Our schools can never reach their highest state of perfection until these two incompatible states of discipline and instruction are finally and effectually separated.

While these are the principal faults of ungraded schools, there are others of scarcely less importance, among which are the following: 1st. The difficulty of having the school-room properly seated, so as to accom-

moderate all sizes of pupils. 2d. The great range of studies necessary to be pursued at the same time, rendering it difficult for the teacher to reach a high degree of excellence in the teaching of any. 3d. The great number of classes, allowing the teacher but an exceedingly brief and an entirely inadequate portion of time to each, and causing him to hurry from one to the other so rapidly that he often can not do justice to either. 4th. The confused and desultory manner in which instruction is carried on, renders the school unattractive both to pupil and parent, and, consequently, there is little interest manifested in its welfare.

These difficulties will never be entirely removed until our schools are graded, and there has been developed and applied a complete and thorough system of instruction. This system should embrace, substantially, the whole course now pursued in our common schools, academies and colleges, open to all, but allowing each individual to take only such portions of the advanced course as would suit his inclination or circumstances. The application of the different portions of this system of instruction to the different grades of school, and the nice adaptation of its progressive parts, are problems which demand for their solution the highest wisdom, combined with the largest experience, but when once solved, they will be of incalculable benefit to education everywhere.

When this system of instruction becomes permanent, the schools must be much more efficient than at present, and pupils will advance with a correspondingly greater rapidity. Teachers will not be left in doubt as to what

course to pursue, for a specific work is arranged for each term and year, and every day will bring its duties, which must be accomplished. Teaching will progress according to well-organized principles, instead of being left to the caprice of individual teachers, and, in a great measure, will become equalized throughout the country. The gradation, thorough system, and division of labor will effect a saving of time equal to one half of the entire period now spent in the school-room, thereby doubling the educational advantages of the great mass of our children. The means of a *liberal* education will be brought within the reach of all, at a cost but little greater than that of our present imperfect and inefficient system.

A full enumeration of the advantages of the proposed improvements, and of the changes necessary to effect it, would fill a volume. A very brief view of the main features of the system, as far as they relate to the general organization of schools, and the building of school-houses, is all that would here be appropriate.

1. PRIMARY SCHOOLS.—Primary Schools should embrace a five years' course of study, extending from the age of five to that of ten years, with pupils of the average ability. They should take the place of the present district schools, and be brought within the reach of every home in the land. The instruction should proceed in a regular course, and the pupils should be advanced, year by year, into higher classes, until the whole five years' course is thoroughly mastered.

2. INTERMEDIATE SCHOOLS.—Intermediate Schools should

embrace a four years' course of study, continuing the work of instruction to the age of fourteen. They should be formed by uniting a sufficient number of the Primary Schools to furnish the requisite number of pupils of a proper grade. The instruction here should be systematic, and the pupils advanced, year by year, as in the Primary Schools. The course of study in these schools would be about the same as that now pursued in our academies, and in the higher classes of our common schools.

3. HIGH SCHOOLS.—High Schools should also embrace a four years' course, carrying on instruction to the age of eighteen. Such schools might be established by uniting a dozen or more intermediate districts. Perhaps one in each county might suffice to meet the wants of the people. The instruction in these schools would be about equivalent to that of our ordinary colleges, though perhaps of a more immediately practical character. This would finish the system of strictly public schools, though, beside and beyond them, others of a different and special character would be established, all necessary to the perfect development of a scheme of national education. Prominent among these would be the following:

1. THE UNIVERSITY.—The University should be devoted to professional instruction in the departments of Science, Language, General Literature, Law, Medicine, and Divinity. It should be the crowning glory of all our systems of education, carrying instruction to the highest point attainable in our present civilization, and elevating civilization itself. It should present the golden opportunity to the scholar in pursuit of the highest cul-



ture, and form the perpetual fountain from which wisdom and knowledge would flow downward through all the grades of schools, until it reaches every inhabitant of the land, and elevates humanity to a higher level. The graduates of the University would naturally become the teachers of the High Schools, and from these last would come the great mass of the teachers of the Intermediate and Primary Schools.

2. **NORMAL SCHOOLS.**—Normal Schools, for the professional instruction of teachers, would find their appropriate place. Such persons only as had mastered the High School course should be admitted to these schools, and the whole two or three years spent in them should be devoted to the examination of the great laws which underlie all systems of instruction, and the best methods of putting in practice the principles so developed. Then teaching would no longer be left to the caprice of ignorance and immaturity, but would be systematically and intelligently carried on by persons thoroughly disciplined, and perfect masters of their profession.

3. **WORK SCHOOLS.**—All pupils should be obliged to take the course marked out for the Primary and Intermediate Schools, but beyond this, entire freedom might be allowed. The great mass of pupils would probably not wish to obtain a liberal education, and would desire to enter immediately into some trade or other branch of industry. For the accommodation of this class, Work Schools should be established where they could obtain a knowledge of the fundamental principles of the business in which, in future, they are to be engaged. These



Work Schools would include Artisans, Mechanical, Agricultural, Mercantile, Manufactures and Mining Schools, Schools of Design, etc.

When this system of graded schools becomes the ruling policy in the country, and there shall be established Professional and Work Schools to round out and perfect it; when all these are consolidated and crystalized into a great national system, reaching from ocean to ocean, and so ubiquitous and Argus-eyed, that, from the wilds of the Aroostook to the sands of the Sacramento, no child in the Republic can evade its sight or escape its influence; then will labor, organized into system, and pursued with intelligence, be respected and honored by all men; then will each individual have the opportunity and all the necessary aids to secure the development of his peculiar talent in the direction that nature designed; and then we may expect the evidences of a higher and more beneficent civilization than the world has ever before seen.

In cities, villages, and the more thickly populated portions of the country, the systematic gradation of schools can be easily adopted, and the great advantages arising therefrom at once secured. Indeed, the system is now substantially adopted in most of our larger cities. In the more sparsely settled portions of the country, it is difficult to establish any general system that is entirely unobjectionable; but even there, a steady policy of consolidating districts, instead of dividing them, would finally result in the system of graded schools just described.

In no way can our schools be so greatly benefited as by the more general employment of women as teachers.

When *all* of the Primary and District Schools are taught by women, as they should be, the schools and education generally will be benefited in the following particulars:

1. Women, by nature, are much better fitted to have the control of children than men; and long experience has shown, that they excel as teachers in almost every department. Even the coarse, unruly boys of the winter schools are often more easily subdued by the mild and gentle rule of women, than by the more stern and unbending control of men. In a Primary School, a man is about as much in place as a "bull in a china shop."

2. The employment of women will save the necessity of the semi-annual change of teachers, which is now the almost universal custom in the country; a custom which has not one redeeming feature, but which, in every aspect, is an unmitigated evil.

3. In the present organization of society, the same compensation will employ women of a much higher grade of talent than men; a consideration which ought not to be disregarded.

4. Teaching will become more systematic, and hence the gradation of schools will be facilitated, by creating a desire for a more extended culture and affording time for its realization.

The growing sentiment in favor of the employment of women in the schools in most of the older States, we hail as an omen of decided progress, and as a prophetic assurance of the better time coming.

Where the gradation of schools has been established,

two or more grades are often united in one building under the distinctive name of "Union Schools" and Union School Houses, have become one of the "institutions" of the land. These houses, of necessity, must be larger and more costly than the common District School Houses; yet the cost must be far less than the aggregate cost of several separate houses affording the same accommodations. The lot, out-buildings and general surroundings of a Union House will cost no more than those belonging to each of the smaller houses; so the argument, on the score of economy, is entirely in favor of Union Houses. The comparison is sometimes made between the cost of a large, well-built and commodious Union School House possessing all the modern improvements, and that of several of the old-fashioned, ill-constructed and miserably furnished houses, where children were packed almost to suffocation, and the balance has been found in favor of the latter; but it is unnecessary to say that such a comparison is one-sided and unfair, and that to make it of any value, the same conditions must be preserved in the two cases.

The several plans in this chapter do not form a complete series of Union School Houses; nor would such a series be compatible with the general objects of this work. The series here given are designed to meet the wants of country districts and smaller villages. Plans for the larger and more elaborate Union Houses are left for a succeeding work, in which the whole subject of the village and city School House Architecture shall be fully discussed.

This series commences with houses of two rooms, and

gradually expands to those of four rooms. One design containing eight rooms is given. The prevailing idea of economy is carried out here as in the smaller designs, but greater architectural effect has been produced in consequence of the superior size of the building.

An effort has been made to present designs which, if adopted, will not only answer for immediate use, but will also be permanent. In the construction of School-Houses, it has too often been the case that present necessities alone have been provided for, and, in consequence, the structures have been of the most transient character, causing the whole school-system to appear equally transient and unstable, and rendering necessary a heavy outlay for re-building. With permanent school edifices, the early school-experiences of childhood would be connected with ideas of comfort, and with scenes crowded with the associations of the past, making the school more attractive, and school-life more pleasant and agreeable.

DESIGN NO. XII.

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THIS Design is adapted to districts containing about 100 pupils, and where two teachers are employed. The building is very plain, but has a chaste, substantial appearance. The windows in the first and second stories are separated by panel work, for the double purpose of lessening the expense, and of giving to the whole exterior a more stately and imposing appearance. The expense is decreased by avoiding the use of a cut-stone window-cap and sill, and the effect is improved by throwing both windows into one opening in the brick wall, and thus increasing the length of the perpendicular lines. The wood-house in the rear may be increased in size, so as to afford space for a recitation-room if required. Separate entrances are provided for the sexes, and the pupils of each room are kept entirely distinct. Estimated cost, \$1,200.

## EXPLANATION OF PLAN.

FIG. 47.

Main Building,  $30 \times 28$ .

## FIRST FLOOR.

- A A. Double Porch,  $24 \times 9$ .
- B B. Staircases.
- C. Wood-House,  $24 \times 9$ .
- D. Space in front of Desks, 8 feet wide.
- E. Space in rear of Desks, 3 feet wide.
- F F. Side Aisles,  $2\frac{1}{2}$  feet wide.
- G G. Aisles,  $1\frac{1}{2}$  feet wide.
- H H. Desks,  $3\frac{1}{2}$  feet long.
- I I. Recitation Seats.
- J. J. Blackboards.

## SECOND FLOOR.

- A A. Staircase landing.
- B. Library Room.
- C. School-Room with the same general arrangements as the room below.

It will be seen that separate staircases for the sexes have been provided. The library in the second story may be used for a recitation-room in case of need.



## EXPLANATION OF PLAN.

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FIG. 48.

THIS figure represents the plan of a house with two rooms, both upon the same floor. The cost for underpinning and roof, in a building of this form, is much greater than where one room is over the other, though this is partially balanced by the cost of the staircase of the latter. A building of this size, of only one story, will have a low, *squat* appearance, incompatible with architectural beauty. It is well arranged, however, for the convenience of the School.

Main Building,  $30 \times 48$ .

A A. Double Porch, each  $8 \times 12$ .

B B. Space, 10 feet wide.

C C. Space, 3 feet wide.

D D. Side Aisles 2 feet wide.

E E. Aisles,  $1\frac{1}{2}$  feet wide.

F F. Blackboards.

G G. Slide Doors.

H H. Desks,  $3\frac{1}{2}$  feet long.

I I. Recitation Seats.

J J. Doors to Wood-House and Back Yard.

DESIGN NO. XIII.

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THIS building contains three rooms, and is designed to accommodate from 100 to 150 pupils. Its exterior is finished with due regard to beauty and just proportion, and all the parts are so disposed as to present a fine commanding appearance. It would be well adapted to a situation upon a prominent and sightly corner lot. Its cost would be but little greater than that of a building of the same size constructed in the plainest and cheapest manner. The rooms all open into a single hall in the wing, which has both a front and back entrance. This hall is provided with double doors for winter use, as an additional protection from the cold. The cupola adds much to the beauty of the building, and can be used also for a bell-tower. Estimated cost, \$1,800.

## EXPLANATION OF PLAN.

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FIG. 50.

Main Building,  $32 \times 24$ .

Wing,  $30 \times 23$ .

### FIRST FLOOR.

- A. Front Entrance,  $6 \times 5$ .
- B. Back Entrance,  $6 \times 6$ .
- C. Hall,  $14 \times 6$ .
- D. Staircase  $3\frac{1}{2}$  feet wide.
- E. Closet.
- F. Front space in Primary Room, 8 feet wide.
- G. Rear space in Primary Room,  $2\frac{1}{2}$  feet wide.
- H H. Primary Desks, 3 feet long.
- I I. Recitation Seats.
- J J. Blackboards.
- K K. Side Aisles,  $2\frac{1}{2}$  feet wide.
- L L. Aisles,  $1\frac{1}{2}$  feet wide.
- M. Front space in Middle Room,  $8\frac{1}{2}$  feet wide.
- N. Space in rear of desks, 2 feet wide.
- P P. Side Aisles, 2 feet wide.
- R R. Aisles  $1\frac{1}{2}$  feet wide.
- S S. Desks,  $3\frac{1}{2}$  feet long.
- X X. Inside Doors for Winter.
- Y. Fence dividing the two Yards.

### SECOND FLOOR.

- A. Staircase Landing.
- B. Closet.

Seats and Spaces nearly the same as below.

DESIGN NO. XIV.

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THIS Design contains two school-rooms and a teacher's residence attached. It is plain, but solid and substantial, and its exterior has an air of unostentatious worth, in perfect harmony with the design of its construction. In this, as in the two preceding designs, the windows in the two stories are placed in the same opening in the brick walls, giving long, unbroken perpendicular lines. It will be noticed that the bell-tower is supported by a wide brick buttress extending from the ground, so that it has a "visible means of support." In many cases this precaution is not taken, and the cupola appears like an excrescence or a mere appendage to the roof. The interior arrangement of the school-rooms is similar to that of the other designs. A door opens immediately from the small room adjoining the principal school-room, into the hall of the teacher's residence. This building might properly be located on a corner lot. Estimated cost, \$1,800.

## EXPLANATION OF PLAN.

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FIG. 52.

Main Building, 32 × 26.

First Wing, 30 × 26.

Second Wing, 18 × 13.

### FIRST FLOOR.

A. Porch, 9 × 9 inside.

B. School-Room, 26 × 25.

C. Principal's Room, 6 × 8.

D. Hall, 14 × 8.

E E. Staircases.

F. Sitting-Room, 16 × 14.

G. Kitchen, 13 × 12½.

H. Rear Hall, 6 × 4½.

I. Scullery and Cellar Stairs.

J. Pantry, 8 × 6.

K. China Closet,

L. Nursery, 12 × 10.

M. Bath-Room, 8 × 6.

N. Closet.

### SECOND FLOOR.

A. Landing.

B B. Bed-Rooms.

C C. Closets.

D. Library Room.

E. Upper Hall.

F. Upper School-Room.

## TEACHERS' RESIDENCES.

We here offer a few suggestions in regard to the propriety of having a teacher's residence in connection with the school-room. We have already adverted to the evils arising from a frequent change of teachers in Primary Schools, and suggested a remedy. When such changes occur in Union Schools, these evils seem multiplied. It prevents the adoption of a uniform state of discipline and a systematic course of study, both of which are indispensable to the highest success of the school. It prevents teachers from making that special and thorough preparation for their work, which they would do were they assured of continued labor at remunerative prices. It destroys all permanency in the teachers' profession, obliging those who embrace it to be, like the descendants of Ishmael, wanderers upon the face of the earth.

In several of the countries of Europe, teachers are recognized as belonging to the learned professions, and provision is made for them the same as for the parish parson. They have an independent existence, a position in society, and, above all, a *home*. In consequence, teaching is looked upon as most honorable; superior talent seeks that department of labor, and the teacher is regarded by the people as a faithful mentor, a sage adviser and a sincere friend.

A similar result must ensue in this country, by adopting a similar policy. With the assurance of a respectable support, and a permanent home, men with families would engage in the profession, bringing the ripened judgment of mature years to aid them in their



work, and rescuing the business from those who only engage in it as a stepping-stone to something more lucrative. All their interests would soon become identified with the interests of the community in which they lived, and all matters pertaining to schools would become solid, substantial and permanent.

This arrangement is peculiarly adapted to the villages of the older States. The teacher, a man of character and intelligence, thoroughly qualified for his business, would elevate the character of the school and excite an interest in education throughout the community. By becoming familiarly acquainted with his pupils, their character, disposition and peculiarities, he would know how to control, to assist and to direct. Besides this, from his position he could exert a commanding influence in society, and help lift it above those petty vices incident upon village life, which are so often engendered by the idleness resulting from the cessation of labor in winter. The teacher could devise schemes of attractive improvement and innocent amusement which would fill up the hiatus in the year's labor, and save the young from a course of vicious and degrading dissipations.

Wherever this matter has been tried in this country, the results have been in the highest degree satisfactory; and we fully believe that its general adoption would give character and stability to our common schools. The plan, here given, is designed more to call attention to the subject than to furnish a model; and we would respectfully ask for it, and the accompanying suggestions, the attention of all interested in the success of our public schools.

DESIGN NO. XV.

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THIS building contains four rooms, and will accommodate from 150 to 200 pupils. It is specially adapted to village schools, and should be placed upon a prominent corner lot. Its exterior is imposing, and possesses many elements of beauty, and yet it has no ornaments except the simple brackets upon the cornice. The plain brick walls, with the pilasters, cost but the merest trifle more than though they were built perfectly plain, and the windows are decidedly cheaper than though the series in each story were finished independently. When contrasted with a plain brick building, like a factory, there appears to be but little difference in the construction, yet the difference of appearance is very great. An analysis of this difference will show that the beauty consists in having *all* the perpendicular lines unbroken, many of them extending from the foundation to the cornice, and *no* wide, unbroken, horizontal spaces.

This arrangement is in accordance with a universal principle of architecture, which should be recognized in the construction of every building, either public or private, thus avoiding the reproduction of those vast piles of mere brick and mortar which now so often disfigure the landscape.

The tower in the corner adds to the harmony of the building, and serves for the double purpose of a staircase and bell-tower. Estimated cost, from \$2,000 to \$2,500.

## EXPLANATION OF PLAN.

FIG. 54.

Building,  $50 \times 30$ .

## FIRST FLOOR.

Primary Room,  $22 \times 19$ .Intermediate Room,  $28 \times 25$ .A. Entrance to lower rooms,  $8 \times 7\frac{1}{2}$ .B. Staircase in Tower,  $12 \times 12$  outside.C. Clothes-Room,  $8 \times 7\frac{1}{2}$ .

D. Closet under Stairs.

E. Space in front in Primary Room,  $7\frac{1}{2}$  feet.

F. Space in rear " " 3 feet.

G G. Side Aisles,  $1\frac{1}{2}$  feet wide.H H. Aisle,  $1\frac{1}{2}$  feet wide.

I I. Recitation Seats.

J J. Blackboards.

K K. Primary Desks, 3 feet long.

L L. Space in front in Intermediate Room, 7 feet.

M. Space in rear, 3 feet.

N N. Side Aisles, 2 feet.

P P. Aisles,  $1\frac{1}{2}$  feet.R R. Intermediate Desks,  $3\frac{1}{2}$  feet long.

S S. Stoves. T T. Tables.

## SECOND FLOOR.

A. Clothes-Room and Passage.

B. Recitation-Room,  $20 \times 16$ .

C. Case for Books and Apparatus.

D D. Recitation Seats.

E. School-Room,  $32 \times 28$ .

DESIGN NO. XVI.

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ONE of the greatest difficulties encountered in the building of large School-Houses, is the adoption of a form that will unite the several conditions, fine appearance, fair proportions, convenience of division and economy of construction. Of all possible forms, the circular contains the greatest area to a given number of feet of outside wall, but the circle can neither be economically constructed nor easily subdivided into rooms. The nearer the approach to the circle, the greater is the area inclosed, and hence the octagon has often been adopted in preference to other forms. The chief fault of the octagon is the difficulty of partitioning, and the loss of room which results therefrom, and hence it is seldom used in the construction of large buildings, but rectangular forms are adopted instead.

Of all rectangular forms, the square contains the greatest area in proportion to its outside wall, and is therefore the most economical of all as far as space is concerned; but it is the most difficult of all to manage so as to make a pleasing exterior. Most large square buildings are extremely tame and monotonous, and if surmounted by a

hip-roof, they become offensive objects to the sight. Still, on account of their economy, they continue to be built, and are continually officiously thrusting themselves upon our notice in nearly every village in the land. People gaze at them, pronounce them ugly, and believe that the fault is in the form itself rather than any defect in the arrangement of the architectural details. This conclusion, we think, is erroneous, and we believe that the details of square buildings may be so arranged that, without any considerable extra cost, they will produce a fine architectural effect.

In the two succeeding Designs we have endeavored to show how this object may be accomplished. In their construction the Italian style of architecture has been adopted; but we would observe that this is by no means the only style that might be followed to produce the same result. This style is now very popular in some sections of the country, and is extensively used in the building of both public edifices and private residences. It is admirably adapted to the construction of Village Union School-Houses, Academies, Seminaries, and all buildings that are to occupy isolated positions.

The peculiarities of this style consist in the irregularities of the outer walls, and corresponding ones in the roof, the numerous pilasters giving to the outside surface the appearance of panel-work, the heavy projecting cornice and the perfect symmetry of the whole structure. All these conditions are essential to this style of architecture. Buildings erected in this manner appear highly ornamental, yet the ornaments entirely depend upon the



arrangement, relative position, and exact balance of the parts.

Figs. 55 and 56 represent the front and side elevations of Design No. XVI. drawn geometrically instead of in perspective. The building contains four school-rooms and four recitation-rooms, and is designed to accommodate from 250 to 300 pupils. It is specially adapted to a high, commanding situation, where it can be seen from all sides. It has an imposing appearance, and would be considered an ornament in any village or city. The projections in both front and rear are for use as well as symmetry, the former being used for staircases, and the latter for recitation-rooms. The interior is most admirably adapted to the purposes of a school, and within little space contains all the conveniences necessary to its highest success. Estimated cost, \$3,500.



## EXPLANATION OF PLAN.

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FIGS. 57 AND 58.

## FIRST STORY.

Whole Building,  $60 \times 54$ .

A. Front Projection,  $36 \times 14$ .

B. Rear Projection,  $36 \times 14$ .

C C. School-Rooms,  $32 \times 25$  inside.

D. Recitation-Rooms,  $34 \times 13$ .

E E. Front Halls.

F F. Staircases.

## SECOND STORY.

A A. School-Rooms same as below.

B. Recitation-Room,  $32 \times 13$ .

C C. Recitation-Rooms,  $14 \times 11$ .

D D. Landings from Staircases.

It will seen that the partitions, between the school-rooms, and between the school and recitation rooms, are provided with sliding doors, so that the rooms can all be thrown together. The doors should be so arranged that they would slide away from E E, and leave the space entirely free. In this manner the two school-rooms and the recitation-room could be thrown into one on public occasions or for chapel exercises.

DESIGN NO. XVII.

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WHEN Union Schools are first established, it often happens that the people, not fully understanding their character and wants, provide very inadequate School-Houses; and, in consequence, the school is much crippled in its usefulness through a series of years, and at last the expense of a new house must be incurred. The principal fault arises from not building large enough to accommodate the school. In the zeal to avoid unnecessary room, economy is carried to the very verge of parsimony. All side and recitation rooms are summarily dismissed, and the school-rooms themselves are pared down to the very smallest dimensions, the controlling principle seeming to be "to get the greatest possible number of pupils into the smallest possible space."

We need not here reiterate what we have before said in regard to the space necessary in a school-room. A decent respect for the principles of morality and the laws of health, both demand that this practice of crowding and cramping pupils should at once be abandoned. It is an evil without one redeeming feature, and is a reproach

and disgrace in any civilized community. But knowledge is of slow growth, and we have endeavored to effect a temporary compromise by giving a Design in which the full integrity of the school-rooms has been preserved, but from which has been excluded all other kinds of room except the necessary passage-ways. In no other form could there be a more compact arrangement and so little waste room. Indeed, this very excellence is the greatest real defect of the Design. There are times when side-rooms seem absolutely essential to the well-being of the school, but the want of them in this instance may be partially remedied by finishing the attic story. This room would be 16 feet high in the center, sloping down to the sides where it is 6 feet high. It might be used as a general play-room for public exercises, or for a temporary school-room during those terms in the year when the school is most crowded.

The exterior of this Design is in the Italian style, like No. XVI. It has two fronts on opposite sides precisely alike, and it should be placed on the center of a lot fronting two streets. It is moderately ornamental, and would make an imposing appearance if built upon a slight eminence, at some distance from other buildings. Figs. 59 and 60 are the geometric elevations of the front and side of this building. Estimated cost, \$4,500.

EXPLANATION OF PLAN.

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FIGS. 61 AND 62.

Whole Building,  $70 \times 56$ .School-Rooms,  $26 \times 24$ .Halls,  $32 \times 10$ .

It will be seen that this building contains eight school-rooms, and will accommodate 400 pupils. The four rooms on each story may be so arranged with slide doors that they can all be thrown into one on public occasions. The projections on each side of the building are just wide enough for passages and staircases, and not one foot of room is lost. Wardrobes, for the depositories of hats and bonnets, may be placed under the staircases in the lower story, and at the sides of the passages in the upper. A basement should be excavated for the storing of fuel, and other purposes. A building of this size can be most economically heated by hot-air furnaces.

## CHAPTER VI.

### ORNAMENTAL DESIGNS.

IN the great majority of our rural districts that School-House is best, which, answering all the purposes of education, is the plainest and most economical. The plainness will be in keeping with the general unpretending style of the surrounding farm-houses, and the economy is indispensable in a region where the wants of the people, and the means of satisfying them, are both circumscribed by necessity, and where an artificial state of society has not introduced artificial and costly customs. In such a region, to build an expensive and highly ornamental School-House would be extremely absurd. The contrast between it and the surrounding buildings would be unpleasant, and the school might thereby incur a hostility from unthinking people which would materially injure it.

In a suburban region, on the contrary, where nearly all the houses are the costly and highly ornamental residences of men of wealth, the plain School-House would be out of place, and something of a more elaborate character is demanded. But even here a due regard must be paid to the fitness of things. Education is a sober, serious

matter, and all its surroundings should be of like character. A pretentious, gaudy School-House would be out of character in any place. We may make it as substantial as we please; we may construct all its parts so that each one, and all combined, will be perfect models of beauty, and we may elaborate until we arrive to the very perfection of architectural art, but we can never be forgiven if, in a moment of weakness, we consent even to tolerate the flaunting and tawdry.

We do not propose to give a complete series of Ornamental Designs. When costly School-Houses are demanded, recourse can be had to professional architects, who can furnish Designs which will be in keeping with the natural and artificial surroundings, and at the same time will suit the individual preferences of those interested. We have given three Designs of this kind, as suggestive of what may be done in this direction. In all the elaborations, however, we have been governed by the principle which we laid down in the outset, "never to introduce ornament for ornament's sake."

As society advances in intelligence, and education begins to receive that attention which its intrinsic merits demand, we feel confident that the subject, School-House Architecture, will be more and more studied, until finally every new School-House erected will be a solid, permanent structure, built with due regard to all the fundamental principles of architectural art.



DESIGN NO. XVIII.

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THIS Design is adapted to a large country or village district. Fig. 63 shows it in perspective, and figs. 64 and 65 are geometric elevations of the front and side. Its exterior is imposing, and it is well adapted to a level region of country. The ornamental portions all have their uses. The central tower is a belfry, and the two side towers are simply the ornamental roofs over the porches. The buttresses on the sides are chimneys and ventilating flues. The other parts are very simple and plain, yet the effect on the whole is pleasing.

This Design can not be recommended on the score of economy, as the construction of both the steep roof and the ornamental front will involve extra expense. The general principle has already been stated, that "the cost will always be increased in proportion to the departure from the sternest simplicity."

With a slight change in the proportions of this building, it would make a fine Design for a small country church; and this fact leads us to make the suggestion that, in the future, when the work of both Church and School are more fully comprehended, and the inseparable connection between them better understood, we may expect them to meet, not only on the common ground of a similarity of edifices, but on the higher plane, of pursuing the same ends by the same means.

## EXPLANATION OF PLAN.

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FIG. 66.

A. School-Room,  $35 \times 34$ .

B. Recitation-Room,  $22 \times 11$ .

C. Recitation-Room,  $15 \times 10$ .

D D. Halls,  $10 \times 10$ .

THE internal arrangements of this Design are admirably adapted to the purposes of a school. The school-room is commodious, well arranged, and well ventilated; the halls and recitation-rooms ample and convenient; and every part bears the mark of careful preparation to secure the health and comfort of the pupils.

Two or three teachers may be employed, the pupils sitting in the school-room, and passing to the side rooms for recitation. The room will accommodate from 100 to 130 pupils. The basement should be excavated for a wood-room. With a very little additional expense the whole building might be heated by a furnace. The size of this building might be increased without destroying its harmony or general appearance, by simply preserving the exact proportion of the different parts. Estimated cost, \$2,500.

DESIGN NO. XIX.

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THE general style of this Design is Norman. Its exterior presents a very rich and commanding appearance, and it is well adapted to a prominent site, overlooking a large river or lake, or a little back from the highway near the suburbs of a city. It is also adapted to a great variety of public buildings, besides School-Houses, such as Town-Halls, Court-Houses, and the like. By preserving the exact proportions of all the parts, the size of the building can be very much increased without detracting from its general appearance. The interior will also admit of a great variety of modifications in its arrangements.

While such a building would be out of place in a wild and newly-settled country, in a highly cultivated region it would almost seem like the spontaneous product of the soil. Viewed from the waters of a sleeping lake, through the haze of a silent summer afternoon, while all the landscape lay hushed in repose, it would seem more like the realization of a vision than a sober reality.

## EXPLANATION OF PLANS.

FIG. 60.

THIS figure represents the ground plan of Design No. XIX. As arranged, it contains but one school-room and two small side rooms. The building is  $50 \times 45$ , outside measurement. The room with the present size might be divided so as to make two good recitation-rooms, in addition to the school-room. By enlarging, there might be constructed two or four school-rooms, and a sufficient number of side rooms. Estimated cost, \$3,000.

FIG. 61.

This figure is the plan of Design No. XX. It consists of one school-room, two halls, and a recitation-room. It may be seated in the same manner as the other plans given. The proportions of this plan also can be varied without any injury to the Design.

Main Building,  $34 \times 24$ .

A. Hall,  $10 \times 8$ .

B. Library,  $10 \times 8$ .

C. Recitation-Room,  $16 \times 10$ .

DESIGN NO. XX.

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WE have thought proper to insert one Design in the English Cottage style, although in general it is but poorly adapted to school purposes. This style has been developed principally for exterior effect, the interior being considered of secondary importance; and, although it has been extensively used in various parts of the country, it is not well adapted to the convenience of either public buildings or private residences. The great irregularity of outline, the correspondingly irregular and steep roofs, and the numerous peculiar arrangements of the different parts, make this one of the most costly of all forms that may be adopted.

In the Design here given we have introduced a tower for a belfry, although such a feature does not strictly belong to this style of architecture. This building is particularly adapted to a hilly or mountainous region, being in harmony with the features of such a landscape. There could scarcely be a finer design for a small district among the Highlands on the Hudson, or in any similar situation. Estimated cost, \$700.

## PART IV.

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### MISCELLANEOUS.

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#### CHAPTER I.

##### SCHOOL-HOUSE FURNITURE.

ALL effort at reform in the building of School-Houses will fall far short of accomplishing its object, unless it comprehends a radical change in School-House Furniture. In a great majority of our country districts the furniture used is of the very rudest description, and very poorly answers the purposes of its construction. Even in sections of the country where education has received much attention, and the appearance and condition of the School-House have both been improved, the old seats and benches are often retained. We have already alluded to the positive evils resulting from this state of things. Not only are the pupils rendered physically uncomfortable, but their bodies are often permanently injured, and their mental improvement seriously retarded.



The whole philosophy of this subject seems to lie in the proposition, "That the furniture of the School-House should be such as will conduce to the health and comfort of the pupils, and to the general convenience of the whole school." Anything less than this would be a positive wrong, and ought never to be tolerated. It is also very desirable to take one step farther, and make the whole so attractive that it will have a direct tendency to cultivate good taste and refinement.

School-House Furniture is of two kinds, the special and the general; the former comprehending that which is peculiar to the school-room, such as desks, seats, tables, etc.; and the latter including all the apparatus necessary for the securing and preserving of order and cleanliness.

#### SPECIAL FURNITURE.

In the construction of seats and desks, the following general principles should be observed:

1st. They should be solid and substantial, so as not to be easily broken or disarranged. The furniture of a school-room, of necessity, is subjected to comparative rough usage, and if made weak, its frail appearance invites and stimulates the rudeness which destroys it. Strength, then, is a necessary condition, not only to preserve it from ruin, but to repress the destructive element which is usually precociously developed in children.

2d. They should be easy and comfortable. Churches are usually furnished with easy cushioned seats, although occupied but a limited portion of one day in the week, while the School-House, which is occupied six days in

the week, is supplied with mere hard, rough benches. This custom, to say the least, is not philosophical, and there is no good reason why the seats in a School-House should not be as comfortable as those of a church. This general rule of comfort would preclude the use of seats without backs, and the old arrangement of having the desks around the room next to the walls, and the seats mere long benches before them. The spines of children have often become distorted from having no support while sitting in the school-room; and the amount of suffering which those little frames have undergone from the same cause, in the aggregate, would completely cast into the shade the lesser horrors of the "middle passage" or the tortures of the Inquisition.

Chairs are much more comfortable than benches, and therefore should be used, although the cost may be somewhat greater in the outset.

3d. They should be graded so as to accommodate the different sizes of pupils. The principle is often practically violated, and school-rooms are provided with seats all of the same size. In consequence, either the larger pupils are seated much too low for comfort, or the smaller ones are perched so high that their feet can not touch the floor, and they are obliged to maintain a constant watchfulness lest they should fall from their dizzy eminence. With this latter class, "to sit" becomes an exceedingly active verb, and restlessness, aches and distortions often result.

4th. They should be constructed so as to afford accommodation to the pupil and to all his educational apparatus.

A shelf should be provided for packing away books, slates, maps, etc., and a permanent inkstand furnished to prevent the frequent injury and disfigurement resulting from overturning the ink.

5th. They should be neatly finished, so as to be ornamental as well as useful. In this case, beauty serves the strictly utilitarian purpose of protecting from injury, as well as a higher and perhaps more important one. The rude furniture of the olden time was soon covered with ink-spots, cuts and scratches innumerable. Elaborate jack-knife carvings overlaid each other every term, until the original form and complexion was entirely obliterated. Whenever poorly made or unpainted furniture is used, a like result must follow. Well-finished and elegant furniture, on the contrary, has often been in constant use for years without receiving a single scratch, the beauty preserving it, as well as serving to inculcate habits of order and carefulness. Furniture should always be finished like fine cabinet-work, or else thoroughly painted and varnished.

In their arrangement, the seats and desks should be so placed that each pupil can freely pass to and from his seat without disturbing others, and so that every part of the room is accessible to both pupil and teacher.

To meet all these requirements, single or double desks are generally used. The former are preferable on many accounts; but as they are more costly and occupy more room than the latter, they will probably not come into general use in the country districts. Double desks answer all the demands of Education, are more economical,

and will therefore be usually adopted. In the seating of all the Designs in this work, the double desk has been used, and all calculations in regard to the number of pupils which each room will accommodate have been made with reference to them.

#### DIRECTIONS FOR CONSTRUCTING DESKS.

Clear, well-seasoned hard wood, like birch or cherry, is the best material of which to construct desks, as it is firm and solid, and readily admits of a beautiful finish by the use of varnish alone. Desks made of pine, or other soft wood, should be well painted and varnished. Perhaps drab for the sides, and green for the tops, would be as appropriate as any colors that could be used.

Double desks should be from  $3\frac{1}{2}$  to 4 feet long, and from 10 to 20 inches wide, the dimensions depending upon the size of the pupils designed to be accommodated.

All the edges and corners should be carefully rounded, and all the work should be smooth and well finished.

About three inches of the farther side of the top should be level, and the rest slightly inclined. Great care should be taken not to make the angle of inclination too great, as is often the case. It should not be above an inch to a foot, and perhaps one half as much would be sufficient. Many teachers prefer to have the top of the desk entirely level.

A groove should extend across the level surface to prevent pencils, etc., from rolling off, and provision

should be made for the insertion of a permanent ink-stand. An opening in the farther edge is sometimes made for the purpose of receiving a slate, but of late this arrangement has been abandoned, as no practical good results, and the appearance of the room is thereby much injured.

About five inches below the top of the desk a shelf should be placed, two thirds as wide as the top, and slightly inclined backward.

The standards that support the desk may be wood or iron; and the peculiar manner of constructing each will be fully illustrated in the accompanying diagrams. Wood is cheaper, but iron more durable, and less liable to get out of repair.

The following table shows the height of the seats and desks of the different grades as adopted by Mr. Joseph L. Ross, the distinguished manufacturer of school-furniture at Boston, Mass., and followed, substantially, by most other manufacturers. The height of the desk is measured upon the side next to the pupils.

Extra Chairs, 17 inches high.					Desks, 29 inches.	
No. 1	"	16	"	"	"	27½ "
" 2	"	15	"	"	"	26 "
" 3	"	14	"	"	"	24½ "
" 4	"	13	"	"	"	23 "
" 5	"	12	"	"	"	22 "
" 6	"	11	"	"	"	21½ "
" 7	"	10	"	"	"	20½ "



**PRIMARY SEATS AND DESKS.**—In the past age, the idea that almost any kind of seat would answer for little children, was nearly universal. This idea is still prevalent in some sections of country; and often, while comparatively comfortable seats are provided for the older pupils, those for the primary classes are mere benches without desks, without conveniences of any kind, and often without backs. This condition of things is the result of thoughtlessness and inattention, as a moment's reflection must convince any one, that, of all pupils in school, the little ones should have the most comfortable seats. They have the least strength of all, and the least power of enduring the pain and discomfort that must result from long confinement upon flat, hard benches.

Seats for small children should, first of all, be easy, and they should be so constructed as to admit of several different positions on the part of the occupant. The chairs represented in fig. 1 are of this character. The



FIG. 1.

seats are comfortably hollowed, and the backs are sufficiently high to give ample support, and extend far enough around to enable the pupil to sit erect, or to partially recline in either direction. The pedestals of



these chairs are made of cast iron, and are to be firmly fastened to the floor by screws.

But chairs alone are not sufficient. They have no conveniences for the accommodation of books or other apparatus. This deficiency is sought to be remedied by affixing to them little baskets, as in fig. 2. This form of seating is adopted for Primary Schools in Boston and other parts of the country. Another form of Primary seats is represented by fig. 3. It consists of a bench,



FIG. 2.

long enough to accommodate eight pupils, with a shelf beneath for books. If the great object to be attained is the crowding of as many pupils as possible into a room, then either of these arrangements is admirable. Economy of space is attained, but at the expense of considerations of much higher importance. Slates for writing,

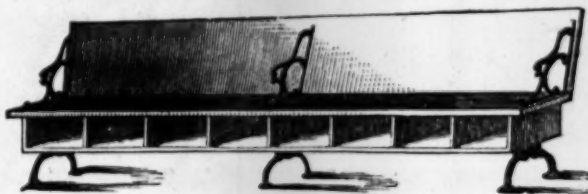


FIG. 3.

drawing and amusement, and many articles that interest children, are indispensable in Primary Schools, and these

can not be conveniently used without desks. Another point should not be overlooked. In a room of ordinary



FIG. 4.

height, when desks are used, as many pupils can be accommodated as can be supplied with pure air; and when desks are dispensed with, there is a tendency to crowd more together, thus ren-

dering the breathing of vitiated air a necessity.

A primary double desk with chairs is represented by fig. 4. The chairs are the same as in fig. 1. The desk is supported by wooden standards, which are hollowed out in the center of the front part, so as to afford easy access to the seat, and are fastened to the floor by means of an iron shoe, as represented in the figure. A wooden clamp, tightly fitted to the bottom of the standard, would form a fastening almost as good. In this style of desk the back is boarded only down as far as the shelf.

Fig. 4 represents a primary double desk, with iron standards. The peculiar form is given to it to make it portable. The different parts are fastened together with screws, so that they can be easily taken apart and boxed up for transportation.



FIG. 5.

A much finer pattern of a primary desk, both in pro-

portion and finish, is shown by figs. 6 and 7; the first representing a single desk, and the second a double one. Either of them would be all that is desirable for a primary room in a Union School, or for the smaller children in the District School. A cheaper method of constructing seats and desks will be given in another place. Before deciding upon the kind of furniture to be procured for



FIG. 6.

the use of little children, let the trustees, or persons to whom this matter is committed, remember that this first starting-point is the most important of all; that habits acquired in the Primary Schools will exert a controlling influence during the entire school-age; and

hence that it is especially desirable that such schools should have every convenience, and should be surrounded by every possible favorable influence. The item of a little extra expense shrinks into absolute insignificance upon taking this view of the subject. We would better commence the practice of economy at any other part of our school system than in the primary room, for a solid and perfect foundation is as necessary in Education as in Architecture. The other articles necessary to the complete equipment of a Primary Room, will be noticed under the head of Apparatus.



FIG. 7.

SEATS AND DESKS FOR ADVANCED SCHOOLS.—The same general principles apply here as in the primary rooms, and the seats and desks should be of the same construction, only larger and stronger. Figs. 8 and 9 represent two kinds of intermediate desks, with iron standards similar to those already described. More light and graceful, and at the same time strong and substantial desks, could scarcely be devised.



FIG. 8.

Fig. 10 represents a double desk and two chairs for larger pupils. The desk is similar to those already described. The chairs are strengthened by continuing the center-piece of the back downward to the bottom of the pedestal, where it acts as a brace.



FIG. 9.

The body of the desk in fig. 11 is a closed box, with two lids, opening upward. Portfolios, for the reception of papers, can be attached to the under side of the lids, if

desired. This arrangement effectually secures books from

dust and injury, but it is doubtful whether these advantages are not more than counterbalanced by the greater



FIG. 10.

cost; the noise made by the opening and shutting of the lids; and the opportunities afforded for mischief, unseen by the teacher, while the lids are open. If this kind of desk is used, bits of rubber should be placed on the



FIG. 11.



under side of the lids to deaden the sound and break the force of the fall. The desk with the shelf, we think, will be generally preferred.

CHEAPER FURNITURE.—The seats and desks that we have described so far are such as leave nothing to be desired in the way of improvement. They are graceful, substantial, comfortable and convenient in an eminent degree. Wherever public sentiment will warrant the expense, a greater advantage will be secured by using this kind of furniture, and in the end it will be found more economical than a cheaper kind; but for districts where the people refuse to incur this expense, a compromise must be effected and cheaper articles devised, that will as nearly as possible answer educational purposes.

The cheapest form of school furniture is that represented by fig. 12. It consists of a combined desk and bench, with wooden standards. In greater or less per-

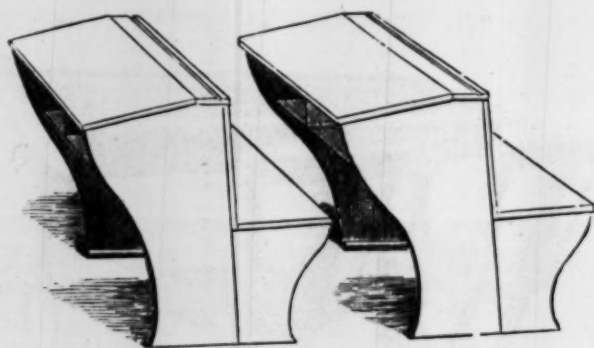


FIG. 12.

fection this form of seating is now more extensively used than any other, but it is open to several objections. The seats are exceedingly uncomfortable, and as they are



connected with the desks, pupils are often annoyed by the jostling of others. To remedy these evils as much as possible, the bench should be hollowed like the bottom of a chair, and the desk should be very thoroughly fastened to the floor. To effect this latter object, a simple cleat across one side of the standard is not sufficient, but a strong clamp should be tightly fitted to the standards of both the desk and chair together, and then fastened to the floor by large screws. The seat standard should be nailed to the desk standard, so that they will mutually act as braces to each other. The back of the desk should incline backward at the rate of about one inch to the foot, so as to form a comparatively comfortable back to the seat. The seat should be placed at right angles with the back of the desk.

Another cheap method of seating, much superior to the last, is represented by fig. 13. The desk is similar to the last, except that its base must be broader to be permanently fastened, as it lacks the support of the seat standard, which is furnished the other. The standards may be hollowed in front so as to

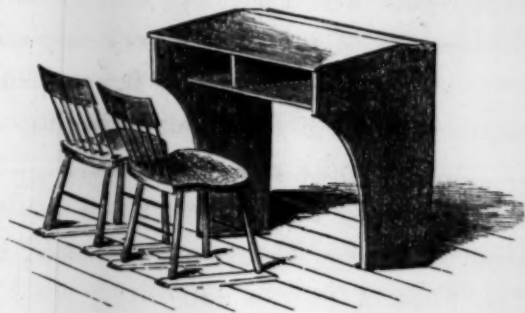


FIG. 13.

render the seats easily accessible, and retain the full width of the standard at the base. The seats used are the common chairs with wooden bottoms, fastened down

by two cleats secured to the legs, as shown in the figure. The cost of the seating of a room in this manner is but a trifle greater than that of the desks and benches, and the furniture is as good as the best we have described, except in the two items of beauty and durability.

Another cheap form of desk is represented by fig. 14. The seats that accompany it may be the common chair,



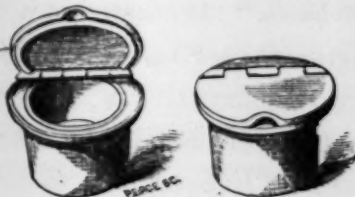
FIG. 14.

like those in fig. 13. This desk is supported by three legs, and possesses some decided advantages. The two back legs are so far from the pupil that he can easily get in and out of his seat, and there are no side standards for him

to strike his feet against so as to make a noise. The front leg is placed in the center, effectually separating the pupils, and preventing them from exchanging seats. The small space which the legs occupy on the floor renders the cleaning of the room a very easy matter. Braces of iron, as represented in the figure, should extend from each leg in both directions to the top of the desk, so as to render it more secure and solid. These legs may be fastened to the floor by iron shoes made to fit them, or a kind of wooden clamp may be used for that purpose. This form of desk is extensively used in some sections of country, and is very popular.

In constructing it extra care should be taken to put all the parts together in the most substantial and workmanlike manner, to prevent its becoming loose.

**INK-STANDS.**—The frequent accidents that happen to ink injures the appearance of the school-room and furniture more than any other one thing, and many means have been devised to remedy the evil. Mr. Ross' ink wells, represented by fig. 15, is one of the best of these. It consists



of a small box of Britannia ware, covered with a lid which opens in the center with a hinge, and a glass lining to receive the ink. In a single desk this ink-well should be inserted near the right-hand corner, and in a double desk in the center of the back part. This ink-well is small, portable, and can be inserted in any form of desk with little trouble. When a school-room is once supplied with them, the annoyance arising from the frequent spilling of ink will at once cease.

Arrangements should also be made to prevent ink from freezing. A simple and cheap apparatus can easily be constructed by any teacher that will effect this object. Take a circular piece of one and a half inch plank and bore a sufficient number of holes about half way through, to receive all the ink-stands in school; put a handle in the center for convenience of carrying, and inclose it in the form of a shallow box. After the writing exercise each day, the ink-stands could then be conveniently gathered and placed near the stove, or covered up for the night; thus accomplishing a double purpose—that of keeping the ink from freezing, and of preventing its use at improper times and for improper purposes.

Another form of school ink-stands is represented by fig. 16, known as "Satterlee's Patent Ink-Stand for Schools." It consists of a malleable iron plate, C, with a screw-thread on its rim fastened securely to the desk by two common screws; a glass cup, D, to contain the ink; and an iron cap, A, to inclose the cup, and with screw-threads upon the inside of the flange, E, to fit the corresponding ones in the plate at the base. The cap is turned on with a wrench, and the ink-stand can not be moved by the pupils. The patentee claims for this ink-stand the following excellences:



FIG. 16.

1. "It furnishes perfect security against injury to books and furniture, occasioned by the accidental spilling or careless use of ink.
2. "In the school-room it places the ink appropriated to the use of the pupils wholly within the control of the teacher, the removal of the cap by ordinary means being impossible.
3. "It protects the ink from dust, prevents evaporation, and affords better security against freezing than any other ink-stand in use.
4. "While it combines beauty of design with the high-

est degree of durability, the price at which it can be afforded is but little in advance of the cost of ink-stands ordinarily used in the school-room. It is asserted by experienced teachers, that the amount saved in the prevention of injury and waste will pay for its introduction in a single term."

RECITATION SEATS.—In every school-room, immediately in front of the desks, there should be sufficient space for class exercises. It is customary in many parts of the country to have a platform occupy a portion of this space; but the wisdom of such an arrangement may well be questioned. For rhetorical exercises a platform may be desirable, but not indispensable; and for every other school purpose a level, unincumbered space is much to be preferred.

This space should be furnished with convenient recitation seats. Benches, joined to the front row of desks,

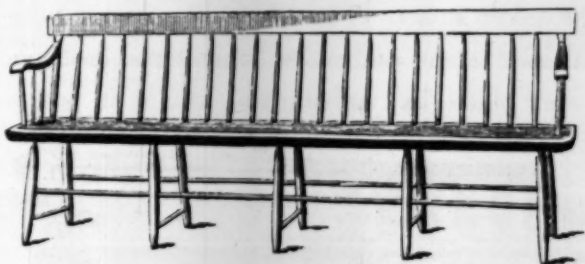


FIG. 17.

with seats hung upon hinges to shut across the aisles, are perhaps the cheapest that can be constructed. Settees, however, are preferable, as they form easier seats, are independent of the desks, and can be easily removed when the space is needed for other purposes. A strong,



substantial and cheap form of settee is represented by fig. 17, and it can be procured at almost any furniture-room in the country. Common Windsor chairs are cheaper than settees, and are sometimes used in the place of them; but they are not so convenient for ordinary school purposes; and the objection is strongly urged against them, that, of necessity, they occasion much confusion from being so easily moved about. Fig. 18 represents a form



FIG. 18.

of settee with iron standards. It is very plain and simple, but strong and substantial. The standards are fastened to the body of the settee by screws, so that it can easily be taken apart. Fig. 19 represents a similar settee, but with side arms and more ornamental castings. This is also very plain but substantial, and it is put together

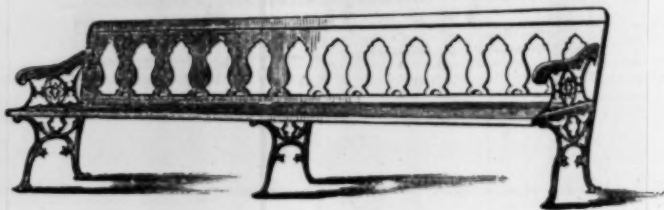


FIG. 19.

by screws, so as to be easily taken apart and packed for transportation. Similar settees should be provided for all recitation-rooms.



**TEACHER'S CHAIR.**—Exceedingly shallow philosophers have very dogmatically asserted that a teacher should never sit in the school-room; and upon this assertion superficial critics have oracularly pronounced judgment concerning a teacher's fitness for his work. The practical conclusion arrived at by these wiseacres is, that a teacher should not be provided with a chair, so that he must stand perforce. But neither the fact nor the philosophy involved in the assertion is true. Among our very best teachers a great diversity of practice exists in this respect, some preferring to stand and others to sit during class exercises. Besides, an indolent teacher would not be less indolent by the withdrawal of all conveniences, nor would an active teacher become indolent by having comfortable surroundings. The teacher's chair we consider an indispensable article of furniture for a school-room. Fig. 20 represents a chair well suited to this purpose.



FIG. 20.

**EXTRA CHAIRS.**—It is now generally conceded that the frequent visits of school officers and patrons materially assists the teacher in his work, stimulates the pupils to greater exertion, and exerts a wholesome influence upon the whole school. To secure these visits, and to make the visitors comfortable while present, a half dozen chairs, similar to those already described, should be provided.

TEACHER'S TABLE AND DESK.—A convenient table or desk should be provided for every school-room. In the olden time, when the teacher was looked upon as an embodiment of dignity and authority, a permanent seat and desk, like a throne, on a high platform in one end of the room, was provided for him. From this exalted situation he issued



FIG. 21.

his peremptory mandates to his trembling subjects below, and when he descended it was for the purpose of wielding his scepter of authority, the ferule. Although the old ideas of teaching have mostly been superseded by those of a less rigid and more humane character, the teacher's desk is still often perched upon an eminence difficult of access, and almost isolated from the school. Instead of such an arrangement, it would be better to dispense with stationary desks altogether, and to use in their place movable tables or desks.

Fig. 21 represents a cheap table designed expressly for the school-room. It contains one drawer, and has a railing upon the back side to prevent books and other



FIG. 22.

things from falling off. Fig. 22 represents a table cov-

ered with cloth, and more highly finished than the last. Figs. 23 and 24 represent two forms of desks, one containing two drawers, and the other nine. These



FIG. 23.

drawers are very convenient to hold various kinds of educational apparatus, which, if left exposed, would be liable to injury. Tables and desks, built in this manner, and highly

finished, are ornaments to the room, and are less liable to injury than inferior ones.

**LIBRARY CASES.**—A library of books of reference is indispensable to the highest welfare of every school, and a library for circulation is one of the most important of all our educational auxiliaries. In some of the States, School District Libraries form an important part of the whole system of education, and experience has demon-



FIG. 24.

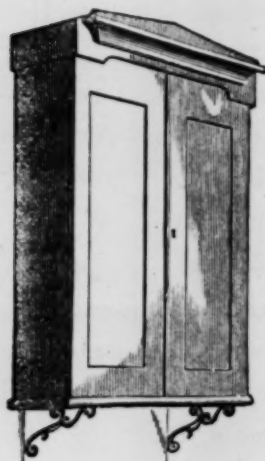


FIG. 25.



FIG. 26.

strated that their value can not easily be overrated. A library should always be kept in the School-House, where both teacher and pupils can have access to it, and where it can be used to the greatest advantage. A suitable library case should be provided for the safe keeping of the books. Fig. 25 represents a small and cheap case adapted to district schools. It can be supported by brackets, as in the figure, or set upon

a table. This case would probably contain all the books belonging to the library of an ordinary district in the country, and would be within the reach of all. Fig. 26 represents a larger and more costly case adapted to the wants of large district and union schools. The deep cupboard at the bottom may be used as a depository for maps and apparatus; and the drawers would be convenient for a variety of purposes.

## FRENCH'S METHOD OF SEATING.

I am indebted to J. Homer French, former Principal of the Newtown Academy, at Newtown, Conn., for the following method of seating a school-room.

In this arrangement the seats and desks are placed around the sides of the room, instead of occupying the center of the floor. The seats are chairs that revolve upon a pedestal, and the desks are all built upon a shelf which extends around the room next the walls. Fig. 27 represents a section of the desk, showing the relative size and position of the different parts. A

represents a shelf eight inches wide, extending around the walls of the room, two feet above the floor. B is another shelf firmly screwed to the bottom of A, and extending four inches farther into the room, for the purpose of forming a rest for the lids of the desks. These shelves are supported by brackets, as represented by C. D is another shelf, placed from 12 to 15 inches above A, and supported by the

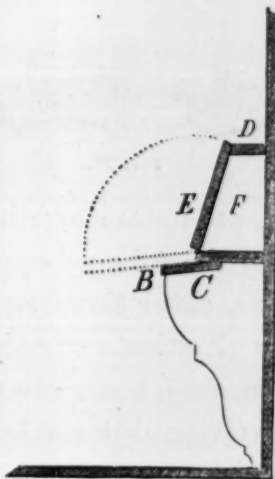


FIG. 27.

partitions between the desks. The space between A and D is divided into compartments from 24 to 30 in width by plank partitions, each of which compartments forms a desk for a pupil. E is a desk lid, long enough to just shut between the partitions, and wide enough to extend half an inch above D, attached by two butts to the shelf



A. A strip of plank, the thickness of the lid, is to be nailed upon the edge of the partitions, so as to be flush with the lid when shut. When the desk lid is open, it furnishes a convenient writing and study desk for the pupil; and when shut, it incloses the space between A and D, protecting the books from both dust and injury.

Fig. 28 represents a chair, turning upon a pivot, used with this kind of desk. In the pedestal the bottom of the opening, B, is just large enough to receive the spindle, A; but about three fourths of an inch above it

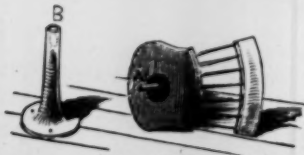


FIG. 28.

increases to more than triple this size, but contracts again at the top. While the pupil sits erect, the chair remains in an erect position; but when he at-

tempts to lean over in either direction, the spindle slips into the enlarged opening, and the chair tips about half over, either throwing him upon the floor, or rendering his situation extremely unpleasant. Erectness of position, then, becomes a matter of necessity. The ordinary revolving chair can be used if preferred.

Fig. 29 represents a room seated in this manner. The main building is 32×26 feet, and the porch 14×6 feet, outside measurement. A, Teacher's Platform, D Desks, F Recitation Seats, S Stove. One half of the desk lids are represented open, and are half shut. The teacher's platform and desk are in one corner of the room, from whence he can easily observe all the pupils at once. The recitation seats are placed opposite the platform, and at a



convenient distance from it. The stove occupies the center of the room, so that all parts are heated alike. The revolving chair is indispensable here, as the pupil is sometimes required to face the teacher. When the room is

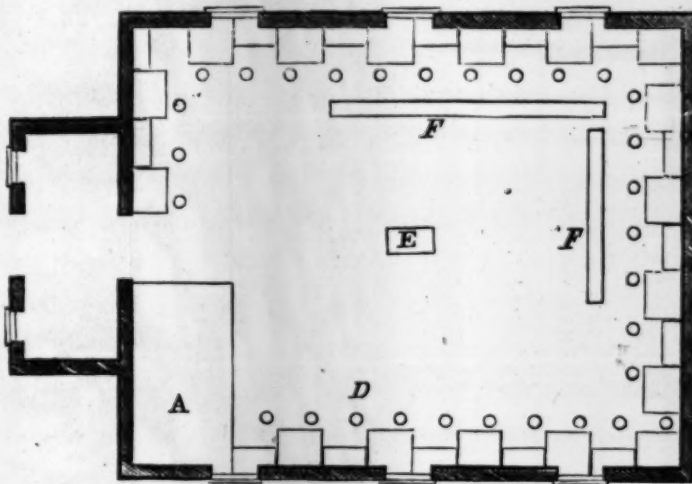


FIG. 29.

to be cleaned, the top of the chairs may be taken off, leaving the pedestals alone to interfere with the process. This whole arrangement is simple, cheap, convenient, and in several respects superior to any other which has yet been devised.

Nearly the same number of pupils can be accommodated in a room seated in this manner as in one furnished with double desks, and the cost will not be more than from one third to one half as great. The principal objection to the whole plan is the use of revolving chairs, which occasion much noise if they are not kept well oiled.

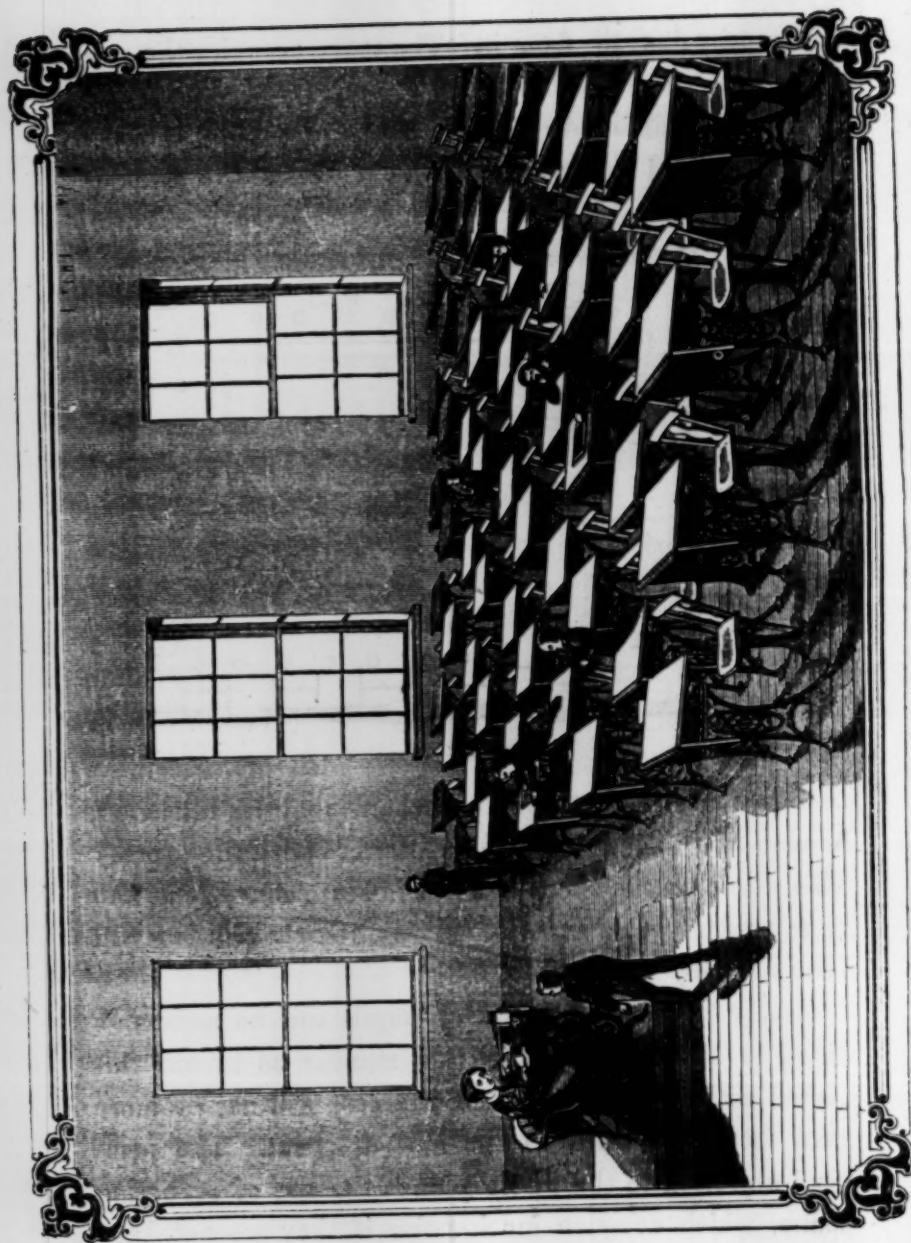


FIG. 30.

WOODCOCK'S METHOD OF SEATING.—Fig. 30 represents a method of seating a School-House, invented and patented by Virgil Woodcock, of Swanzey, N. H. The engraving represents the plan, so that little description is necessary. Two rows of single desks are combined together, so that they occupy but little more space than double desks. It might properly be called the diagonal method of seating. The following advantages are claimed by the patentee for this arrangement over any other :

1st. "With this arrangement as many pupils can be seated in the room as by the use of double desks, and each one will be entirely independent of all others.

2d. "There is a saving of about one fourth of the space necessary for the usual arrangement of single desks.

3d. "The desks and chairs are arranged diagonally on the floor so that no two pupils can look at each other without one of them turning partially around, rendering secret playing and whispering exceedingly difficult.

4th. "When the pupils arise to go to recitation or to leave the room, they at once step into the aisle without coming in contact with each other.

5th. "Pupils are more directly under the eye of the teacher, rendering the maintenance of order much more easy."

When single desks are to be used, it will be seen that there are decided advantages in placing them in this diagonal manner, as enumerated by the patentee; but the cost is considerably greater than that of double desks for the occupation of the same space, and for the accommodation of an equal number of pupils.

**COST OF FURNITURE.**—The foregoing illustrations of Furniture have been mostly taken from the list of Mr. Joseph C. Ross, manufacturer of School Furniture, 413 Broadway, New York, and corner of Hawkins and Ivers streets, Boston. The following is a list of his prices for the different articles enumerated, put up securely for transportation:

Chair .....	Fig. 1.....	\$1 00 each.
“ .....	“ 2.....	1 25 “
Bench.....	“ 3.....	1 00 per foot in length.
Chairs and Desk .....	“ 4.....	4 25
“ .....	“ 5.....	4 50
Chair .....	“ 6.....	3 00
Chairs .....	“ 7.....	5 00
“ .....	“ 8.....	5 25
“ .....	“ 9.....	4 75
“ .....	“ 10.....	6 50
“ .....	“ 11.....	9 50
Ink Wells .....	“ 15.....	30 00 per gross.
Recitation Seat .....	“ 17.....	75 per foot in length.
“ .....	“ 18.....	1 25 “ “ “
“ .....	“ 19.....	1 50 “ “ “
Teacher's Chair .....	“ 20.....	3 50
“ Table.....	“ 22.....	7 00
“ Desk .....	“ 23.....	16 00
“ .....	“ 24.....	30 00
Library Case .....	“ 25.....	16 00
“ .....	“ 26.....	55 00

The estimated cost of the other furniture described is as follows:

Bench and Desk.....	Fig. 12.....	\$2 00
Chairs and Desk .....	“ 13.....	2 75
“ .....	“ 14.....	3 50
Ink Stands .....	“ 16.....	30 00 per gross.
Teacher's Table .....	“ 21.....	3 50

The furniture manufactured by Mr. Ross is made of the best kind of well-seasoned cherry and hard-wood, and is warranted not to crack or warp, or in any way get out of place by ordinary usage.

Furniture like that represented by fig. 12, consisting of a desk and bench combined, can be made by any carpenter, at a much cheaper rate than any of the others described. The desks represented in fig. 13 can also be made at a cheap rate, and the chairs can be obtained of almost any furniture dealer at about fifty cents each, a sum but little greater than the cost of mere benches. The desk represented by fig. 14 may also be cheaply made, and a considerable advantage would be gained by its use.

If pine or any other soft wood is used in the manufacture of furniture, paint and varnish become absolutely necessary to prevent its destruction. Well-painted furniture can be kept nearly as long free from scratches as that which has the cabinet-work finish.

French's method of seating is cheaper than any other which is here described, as all the work can be done by carpenters, except making the revolving chairs. These last can be procured for about \$1 25 each. The desks should also be well painted, and the desk lids should be made of hard wood, and simply varnished. There is no economy in the use of Woodcock's method of seating, as the desks cost as much as though used in any other manner, and the right to use them must be paid for.



## GENERAL FURNITURE.

By General Furniture we mean all the apparatus necessary for convenience and cleanliness, but which is not necessarily peculiar to the school-room. Were it not for an almost culpable negligence on the part of school officers generally, it would not be necessary to speak of these matters in a work of this kind; but teachers and pupils are often seriously incommoded, and schools materially injured, by inattention and neglect in little things of this kind. All of the following articles are absolutely indispensable to the highest interests of every school:

1. SCRAPERS.—For the purpose of affording facilities of removing mud from the feet, plank or stone steps should be put up at all outside doors, and stone or gravel walks laid as described in the chapter upon "External Arrangement." These steps and walks should be supplied with scrapers, so that at least one half of the pupils could use them at the same time. We have already noticed a cheap method of constructing these scrapers.

2. MATS.—Every outside door should be provided with one or more coarse mats, and the inside doors with those of a finer character. Mats made of husks are well adapted to the former situation, and pieces of rag-carpet, or something of the kind, would answer well for the latter. Coarse rope matting is more durable, but more costly, than husks. In school-houses of more than one story, it would be well to carpet the staircases with rope matting, to deaden the sound of passing feet.

3. BROOMS AND BRUSHES.—Having taken measures to



prevent the accumulation of dirt in a school-room, there next should be provided means for removing that, which will collect in spite of all precautions. Every school-room should be thoroughly swept every day, and the floor should be well scrubbed at least once a week. For these purposes a broom, floor-brush, and scrubbing-brush or mop should be provided. A small floor-brush is indispensable in removing the dirt from under the seats and desks.

4. **PAILS.**—A mop-pail must necessarily accompany the mop or scrubbing-brush; and there should also be provided a pail and cups, for the purpose of furnishing the pupils with drink when necessary.

5. **WASH-BASIN, ETC.**—In the back hall there should be a sink or bench, furnished with a wash-basin and towel. As personal cleanliness is a cardinal virtue, and as children can not always avoid becoming dirty while at school, the means for removing the dirt becomes a matter of prime necessity. With these facilities, teachers need never allow pupils to enter the school-room with dirty hands and faces; and the result of efforts bestowed in this direction will be, fixed habits of personal neatness, which will add not only to individual health, but to public morality.

6. **UMBRELLA STANDS.**—A water-tight box, or half of a tight barrel, should be placed in each of the front halls to receive umbrellas, and to prevent the annoyance arising from their dripping upon the floor.

7. **CLOTHES-HOOKS.**—Pupils should never be allowed to bring their hats, bonnets, and extra clothing into the

school-room, when the house contains a front hall. In this hall a sufficient number of substantial clothes-hooks should be placed to afford ample accommodation in this particular. These hooks should be numbered, so as to prevent the confusion arising from having several claimants for one hook. Pins made of hard wood might be used for clothes-hooks; and, indeed, such pins would be much better than the common iron hooks, which are easily broken.


8. FIRE APPARATUS.—Besides the stove, several other fire utensils are necessary, for convenience and safety. When wood is used, there should always be furnished a shovel, pair of tongs, and sheet-iron ash-pail; and when coal is used, a scuttle, poker, and screen, in addition to the above. An iron ash-pail is indispensable to afford protection against fire, as many a school-house has been burned in consequence of storing ashes in barrels or some other vessel of wood.

9. CLOCK.—All system in school operations must depend upon the proper observance of time, and hence a good time-piece should be provided. A clock, placed so as to be in sight of all the pupils, is much preferable to a watch in the hands of the teacher alone, for then there can be no excuse for non-performance of duties in the proper time. At the present day the cost of a good clock is inconsiderable, and no good reason can be assigned for not providing one for every school-house in the land.

10. THERMOMETER.—For the preservation of health, a nearly uniform temperature should be preserved. But

our own sensations of heat and cold can not be depended upon, as they are seriously affected by our physical condition; and a thermometer should be provided as a guide, and to prevent the alternate broilings and freezings to which children are so frequently subjected.

In most cases the teacher can succeed in obtaining these articles of general furniture by properly presenting the matter to the trustees or committee. He can also see that they are all put to their proper use. In the matter of cleanliness, especially, he can produce radical and much-needed reforms by a little care and attention. By precept and example he can create a public sentiment in his school, so that an end will at once be put to that filthiness which is now so common in our country school-houses, and lasting habits of neatness will be formed by all his pupils. Another good may incidentally grow out of this, at once important and desirable, and that is, parents may be induced to more frequently visit the school, from its having become a decent and cleanly place.



## CHAPTER II.

### APPARATUS.

ONE of the most mischievous of the mistaken notions of the present day is, that a large amount of costly apparatus is necessary to the success of a school. Wherever this idea has prevailed, large sums of money have been needlessly spent, thus abridging the amount which ought to be expended in matters pertaining to the real, vital interests of the schools. Closely allied to this mistaken notion, widening and deepening the evils growing out of it, has been the error in judgment which has led to the indiscriminate accumulation of many things of little or no utility, and the neglect of those which might be put to profitable every-day use. The ingenious teacher will clearly explain and illustrate every principle of science with extremely little apparatus, and he will be able to excite a much greater interest in his subject by performing his experiments with the aid of such common things as are within the reach of all. If a teacher can so present the subject that the pupils themselves will be interested in devising means for illustrations and experiments, he will have succeeded in overcoming the greatest

difficulty in the whole process of teaching—that of securing attention and awakening mind.

But while we think a costly and extensive apparatus is unnecessary, we would by no means be understood as saying that experiments should not be made, or that scientific truth should be taught by the mere enunciation of abstract principles, without illustration or ocular demonstration. On the contrary, we believe that some kinds of apparatus are indispensable, but that the greater part of such is cheap and easily obtained. For the sake of convenience we will examine this subject under the heads of "General Apparatus," "Apparatus for Primary Schools," and "Special Apparatus."

#### GENERAL APPARATUS.

The first article of general apparatus indispensable in every school-room is a blackboard. There is scarcely a single exercise in the school but may be made more clear and interesting by its use. With it large classes are taught with as much facility as individuals are without it, and there is not a moment in the day when its aid may not be required to elucidate some difficult point, or to teach to the eye what the mind does not distinctly comprehend through the avenue of the ear. A teacher that thoroughly understands drawing can make it compensate in a great measure for the absence of almost every other kind of apparatus. We look upon the blackboard as a school-house fixture almost as important as the roof or foundation-stones; and in this age of the world, there is scarcely a corner of the country so benighted where an



effort would be made to dispense with its use. The blackboard should be a large one, if possible of a size sufficient for all the members of an ordinary class to work at it at the same time. It should be about five feet wide, placed two feet above the floor, and should extend entirely across the side of the room facing the school. In large rooms, where this amount of blackboard would not be sufficient, others might be placed on the sides between the windows. A trough should always be placed beneath the board to catch the dust, and to serve as a shelf for chalk and wipers. In all the Designs given in this work, the blackboard has been placed immediately in front of the school, occupying all the space on that side of the house not taken up by doors.

Blackboards may be made as follows: Take thoroughly-seasoned clear pine planks, one and a half inches thick, being careful to select those from which pitch will not exude; match them, and bring their surfaces to a perfect level and smoothness; set them in a frame, so that they may be driven together if they should shrink; then paint them thoroughly with the best kind of black paint, mixing with the last coat a quantity of pulverized pumice-stone, to make the surface slightly gritty, so that chalk marks can be easily made and distinctly seen. Blackboards made in this manner will need re-painting occasionally, but great care should be taken to avoid a shining surface that reflects the light. When a board becomes shiny, its dark, unreflecting surface may be restored by washing it in a mixture of lampblack, glue, and turpentine. A board made in this manner requires great



care, and must of necessity be quite costly, and many experiments have been tried to find some less expensive article that will supersede its use. The following are a few of these inventions:

1. **THE BLACK WALL.**—In constructing a black wall to be used in the place of a blackboard, care should be taken to have the foundation perfectly solid and unyielding. A brick wall would be the best, but it may also be made upon a lath and stud partition, in which case the studs should not be more than one foot apart, and they should be thoroughly bridged before the lath is laid. The outer coat is made of the same materials as ordinary hard-finish, and is put on in the same manner, only a sufficient quantity of lampblack dissolved in alcohol is mixed with the plaster to make the entire mass perfectly black. To succeed tolerably in making a black wall, it is necessary to have freshly-calcined plaster and pure white sand; and it should be put on by a workman who is accustomed to laying hard-finish. Many failures have occurred by neglecting these cautions. The following recipe, taken from the "Canada Journal of Education," is given as a guide to those who are unacquainted with this matter:

"For twenty square yards of wall, take three pecks of mason's putty (white finish), three pecks of clean, white sand, and three pecks of ground and calcined plaster; add to this mixture three pounds of lampblack dissolved in three gallons of alcohol, and lay it on evenly and smoothly."

2. **PAPER SURFACE.**—The following recipe for a paper

surface for a "blackboard" is given in Barnard's *School Architecture*: "Cover the surface smoothly with ordinary wall-paper, taking care to remove all inequalities; then cover it with the following composition: grind a quantity of lampblack in alcohol, to entirely free it from lumps; mix with it the flour of emery and spirit varnish, using a sufficient amount of lampblack and emery to give the required black and abrading surface; and the varnish should contain only sufficient gum to hold the ingredients together, and confine the composition to the wall. The composition can be applied with a common paint-brush. The surface should be thoroughly dry and hard before it is used."

3. SLATES.—Slates are now obtained sufficiently large to put up in the place of blackboards, and they are much neater and better in most respects than anything else that may be devised, though they cost more than either of the other kinds mentioned.

Blackboards should be supplied with crayons and wipers. A pure article of chalk, cut in the proper form, makes the best and most durable crayon that can be used. There are a great variety of manufactured articles which can be obtained at the shops at a cheap rate, and which are very good. The best and cheapest wipers that can be used are pieces of common cotton cloth or cotton flannel. They will effectually clean the board, and when filled with dust can themselves be easily cleaned. Several of these should be suspended by strings in front of the board for convenience in use.

The next almost indispensable article of general appa-

ratus is a globe. Without a globe a teacher can not succeed in explaining to the comprehension of children the peculiarities of the earth upon which they live, or the ordinary phenomena resulting from the earth's shape and motions. With its aid he can accomplish all this, and can also clearly illustrate and define such geographical terms as children very seldom understand, and can correct errors which almost inevitably result from the exclusive use of maps. A comparatively small and cheap globe, with the full outline of the natural divisions of the earth, is all that is required.

#### APPARATUS FOR PRIMARY SCHOOLS.

The great truths in education, that facts must precede principles, and that the object of primary instruction should be mainly to awaken the attention, and develop powers of close and accurate observation in regard to everything that comes under the immediate cognizance of the senses, are beginning to be fully recognized by modern educators, and taken as the basis of all theories concerning the instruction of the young. The old system of commencing the process of instruction by forcing children to learn mere abstractions, is well-nigh exploded. It is now considered by all who have bestowed much attention upon this subject, that it is much more important that a child should be able to observe and notice all that he sees, hears, or feels, than that he should be able to repeat by rote all the text-books used in school. In cultivating the powers of perception and observation, it is much more effectual to speak to the eye than to the

ear; and to children, experiments and ocular demonstrations are much more easily comprehended than any statements of principles or processes of logical reasoning.

To carry out a system founded upon these principles it would be necessary to nearly entirely change the course of instruction at present adopted for our primary classes, and to furnish our rooms with such tangible objects as will convey important lessons, and furnish the proper foundation for a philosophical course of education. Nature has furnished these objects of sense in lavish profusion, and there is no district in the country too poor to have a bountiful supply of them. But here the labor of the teacher is indispensable, for nature never betrays her secrets unless they are sought for, and the minds of children need directing until they are sufficiently developed to investigate and experiment without aid.

We might with propriety denominate this system of instruction "The Education of the Senses by means of Lessons drawn from Real Objects." To make it at once intelligible and practical, we will examine it under the following heads, viz.:

1. FORM.—Almost the first thing that the child perceives and comprehends is difference in form, and the primary room should be furnished with a great quantity of apparatus to illustrate these differences. Forms very dissimilar should first be taken, and the pupils should be gradually introduced to those more nearly alike, until they are able to accurately discriminate between those that have but very slight differences. They will always be interested in these exercises, as the idea is taught

through the sense of seeing, and can be fully comprehended without any reasoning process. Care should be taken to insure perfect accuracy of observation during every step of this process, and the scientific names should be given to each of the different forms. Apparatus for the teaching of form might consist, 1st, of blocks representing geometric solids; 2d, of different specimens of the animal kingdom; 3d, of the different forms of the stalks, leaves, and seeds of plants; and 4th, of the different forms assumed by minerals and crystals. The use of the geometric solids would introduce the facts and first principles of geometry; and when that science is taken up as a study, the pupil will be already familiar with the terms used, and he will look upon it as an old friend rather than a new acquaintance. The inspection of the different specimens of the animal kingdom would excite an interest in the subject of Natural History, and the transition would be easy from an observation of the forms of animals to that of their habits and peculiarities. The examination of the form of plants, while exceedingly interesting in itself, and presenting a great variety of useful information, will lead directly to the study of botany, in which is unfolded the whole science of the vegetable world. To understand the peculiar forms of minerals and crystals requires a higher development of the powers of observation and a more mature judgment; but the subject can be easily taught if rightly presented, and the pupil at once will become interested in mineralogy. By this system the child, in time, will become perfectly familiar with all kinds of form, and



will be able to accurately describe the shape of anything that he sees.

2. SIZE.—Nearly the same objects that are used to illustrate form may also be used to illustrate size, and the results will be nearly the same. At this stage of proceedings, however, there should be introduced the conventional standards of measure, and the pupils should be taught the tables of measure practically and inductively. The apparatus necessary would consist of an inch, foot, and yard rule for long measure, blocks representing a square inch and foot for square measure, cubical blocks for solid measure, and a variety of measures like gill, pint, and quart cups, gallon, peck, and bushel measures, etc. The tables should then be taught in the following manner: An inch measure is put into the hands of a child, and he is required to draw a line upon the black-board just as long as the measure, then to the end of this he is to add another inch, and repeat the process until he has drawn a line twelve inches in length. He is then instructed to call this whole measure a foot; and with a foot as a basis, he can then measure a yard, rod, etc. So with each one of the measures; take the least denomination as a basis, and teach its name, use, and the number of times it is to be taken to make one of the next higher denomination before the name of that denomination is given. A box or barrel of clean sand should be furnished to experiment with in the dry and liquid measures. After becoming acquainted with the denominations and tables of measure in this practical manner, the pupils should be encouraged to continually apply their



knowledge in the measurement of everything within their reach. They might measure the dimensions of the school-house, the lengths of the neighboring fence-rails and posts; and in time they might measure the distance from the school-room to their respective homes, and the distance around farm lots, thus taking the first practical lessons in surveying.

3. WEIGHT.—The difference in the weight of objects should next be considered. In this, as in form and size, almost every natural object, from the pebbles in the streets to the most delicate organizations, can be used for illustrations and experiments. Conventional weights and the tables should also be introduced, and a balance should be procured as an article of apparatus. The pupils should be taught the denominations inductively, as in the tables of measure; and they should experiment, by weighing everything in the balance, and lifting it to judge of its weight, until the muscles would be educated to determine the weight of any object, with a considerable degree of accuracy.

4. COLOR.—The differences in the color of objects should receive early attention, and every school-room should be furnished with apparatus illustrating the primary colors, the intermediate shades and the neutral tints. This subject now is wholly neglected in schools. In all the seasons but winter, objects illustrating all the endless variety of shades of color may be derived from the leaves and flowers of plants and trees; and by their aid not only would the senses be educated, but a taste for beautiful objects would be cultivated.

5. ORDER.—Order can be systematically taught by the use of objects already enumerated. Every variety of thing may be classified in regard to form, size, weight and color, and each class may be put in its appropriate place. Exercises of this kind will not only cultivate habits of external order, but will lay the foundation of that systematic arrangement of ideas indispensable to the highest progress in science and art.

A child thus carefully trained to habits of observation will see and hear much more than one educated in a different manner; and when are added habits of critical investigation into the origin, uses, relations and causes of things, there is little more to accomplish in the way of education. He will then be able to enter into a series of original and independent examinations, and he can see

“Books in the running brooks,  
Sermons in stones, and good in everything.”

There is not an object in all art or nature but for him will have its lessons of wisdom.

CABINET.—A cabinet of curiosities and common things should be collected to form a never-failing reservoir of objects from which important lessons may be derived. This cabinet should contain specimens of the different metals, such as iron, lead, copper, tin and zinc; of the principal minerals which enter into the composition of the rocks, such as quartz, mica, hornblende, limestone and gypsum; of the most common chemical products, such as salt, saltpeter, copperas, alum and soda; of all the minerals in the immediate vicinity, such as pebbles, fragments of the rocks, clay, sand, and especially such

rocks as contain fossils; of the vegetable world, consisting of the leaves and flowers of all the plants and trees of the vicinity, the different kinds of wood, both with and without bark, the different grains, like corn, wheat, rye, oats, barley and rice; other articles of food, like sago, tapioca, Irish moss, capers, and the like, and different articles for household use, like flax, hemp, cotton, gums, spices and fruits; of the products of the sea, such as shells, sponges, coral, whalebone, and a great variety of other articles; of the most common animal products, such as wool, hair, wax, bones, ivory, etc.; and of manufactured articles, such as silk, linen and cotton fabrics, leather, paper, parchment, crockery, porcelain and glassware, and, indeed, everything used in the domestic arts and in common household operations.

The lessons to be derived from the specimens of the metals and minerals might include an examination of their peculiar properties and qualities; how the members of the different classes differ from each other; where they are obtained, the process of obtaining them, and the agents necessary to effect this object; their relative value, and their several uses in the economy of the world and in science and art. The examination of vegetable and animal products would include the peculiarities of organization, the conditions of life and growth, the geographical distribution of plants and animals, their origin and history, a description of the processes of both nature and art in collecting and preparing them, and their uses to the world. The lessons to be derived from manufactured goods would lead to the examination of

still higher subjects, and would include much of geography, history, mechanics, chemistry, and the like. It will be seen that in every school there can be collected a cabinet of this kind, at little or no expense, which will furnish a perfectly inexhaustible fund of information, needing only an intelligent teacher to elucidate and make it available.

SLATES.—Besides the articles which have here been enumerated, each pupil in a primary room should be supplied with a slate. This will afford unfailing amusement, and the pupil, if properly instructed, can acquire by its aid the first rudiments of drawing. There is scarcely an exercise in the school in which it can not be used to advantage, and it becomes a source of great relief to a child from the wearisome monotony of a school day. Slates should be neat in their appearance and strongly made.

PLAY-THINGS.—The primary room should be supplied with a variety of articles properly termed play-things. These might consist of blocks for the building of houses, beans, peas, and a great variety of articles of like character. Blocks an inch square at the ends and two or four inches long would be, perhaps, the most convenient of any. All these should be arranged in a proper place, and the little children should be permitted to play with them when tired of sitting still, or when not engaged in specific school duties. There is scarcely anything that the intelligent teacher may not make available to instruct, interest, or amuse his pupils.

CARDS AND PICTURES.—There are a great variety of

cards and pictures now prepared for schools; and they are nearly all useful, as they convey instruction through the eye as well as the ear. The alphabet, elementary sounds of the language, and elements of reading may be taught profitably from cards; and such appliances may be used to advantage in illustrating almost every branch of instruction that is introduced into school. Pictures are also very important. Geographical and historical information, especially, can be illustrated and made doubly interesting by the use of well-selected pictures. The appearance of natural scenery, such as mountains, glaciers, rocky ravines, volcanoes, cataracts, tropical forests, and a great number of other things of like character, can be understood better through the means of pictorial illustrations than by the most complete and elaborate descriptions. Pictures should be chosen with care, and such only taken for use as represent something important. In the study of natural history, pictures become indispensable, for scarcely any idea of the peculiar shape and appearance of animals can be gained from mere verbal description. In selecting pictures for schools, avoid the coarse, cheap lithographs of the shops, for they will have a tendency to deprave taste rather than elevate it.

NUMERICAL FRAME.—A small frame, known as the "Numerical Frame," consisting of twelve rows of little balls, and twelve balls in each row, strung upon wires, on which they move easily, is a valuable auxiliary to the teacher in giving instruction in the first principles of numbers. The simple rules of arithmetic, and many things of a



more complicated character, can be readily illustrated by it, and the whole class can be instructed at the same time.

#### SPECIAL APPARATUS.

Several articles of apparatus are necessary for the illustration of special points in the different branches of study, and for the full understanding of matters of abstruse science. The more important of these will be noticed under the following heads:

**MAPS.**—Every school-room should be supplied with a map of the town, county, and State in which it is situated. The first real knowledge of geography must be derived from those objects in nature which can be seen, and all knowledge of maps must first be gained from maps of familiar things. A teacher should always present to the class of beginners a map of the school-room, and of the surface of country immediately surrounding the school-house, drawn upon the blackboard, as a basis for future knowledge. The map of the town should be next brought into requisition, afterward that of the county and State. For general use, outline maps, upon which are given the physical divisions of the earth by means of color, and the political divisions by faint outlines, are much preferable to those that contain names in full. We consider outline maps almost indispensable to the successful teaching of geography. Large maps are much better than small ones, and if an entire series can not well be procured, the two hemispheres may be made to very well answer the purpose. A small series of maps or charts, upon which are given a map and a picture of



each of the natural divisions of land and water, are of very great value, especially in primary schools.

PHILOSOPHICAL APPARATUS.—A great deal of costly apparatus has been prepared for illustrating principles of natural philosophy, which is very excellent in its way, but from its costliness, much beyond the reach of school districts in the country. Almost every necessary experiment can be performed with articles that every teacher can procure at little or no expense. For example, the mechanical powers can be illustrated by such machinery as can be obtained at any farm-house. The lever, the compound lever, the pulley, the wheel and axle, the inclined plane, the wedge and the screw, are all easily obtained or made by the teacher. Common steel yards, a couple of pulley blocks, a wheel or two from an old clock, and a wooden screw, which can be procured at any carpenter's shop, are all that are really necessary for this purpose. Hydrostatics and hydraulics can also be illustrated by an apparatus equally simple. A few tin tubes or bits of lead pipe, and vessels of wood or tin, are all that are necessary, if the teacher is ingenious in regard to their use. We have not space to show all the details of the use of common things for the illustration of principles, but will close by repeating, that all necessary experiments can be made by the use of apparatus that is cheap and within the reach of all.

MISCELLANEOUS.—The following articles would be found useful and convenient: A Tellurion, to illustrate the revolutions of the earth and its relations to the sun and moon, the changes of the seasons, the phenomena of day

and night, the ebb and flow of the tides, and a variety of matters of like character; a magnet and small galvanic battery, to illustrate the subject of magnetism and electricity; and an orrery, to show the relative size of each of the planets in the Solar System, the periods of their revolution, and their respective distances from the sun. A skeleton, to illustrate anatomy, would be very desirable, but it is generally too costly for common schools; and a few lenses and mirrors, plane, concave and convex, and a prism, which can be procured at little cost, are also desirable to assist in simplifying the abstruse subject of optics.

The school should always be supplied with fixtures to make the apparatus available, and to preserve it from destruction and injury. Hooks should be placed in the walls, upon which maps and charts may be suspended, and pointers should be provided for recitation upon maps and blackboards. A cupboard or case should also be provided, for preserving the apparatus when not in use.

## CHAPTER III.

### OUTBUILDINGS.

THE general form and location of all the outbuildings necessary to a school have already been described, and nothing more need be added in regard to the porch, wood-house, etc. Privies have also been briefly noticed, but, in consequence of a general apathy upon this subject, we have devoted this entire chapter to the further consideration of the character, location, and arrangement of these indispensable school-structures. We are fully persuaded that, in consequence of a culpable neglect in this direction, all efforts for the improvement of the social and moral condition of our schools are, in a great measure, neutralized, and that from the same source arises much of the disinclination that parents have to sending their children to the public schools.

In some districts, even at the present day, there is no privy furnished at all. The following extract from the annual report of Hon. John C. Spencer, Superintendent of the Common Schools of New York, to the Legislature, in 1840, very forcibly shows the folly, wickedness, and brutality of this practice.

"A man who should build a good dwelling-house, but provide no place for retirement when performing the most private offices of nature, would be thought to give the clearest evidence of a coarse and brutal mind. Yet respectable parents allow their children to go to a school where this is the case, and where the evil is greatly aggravated by the fact that numbers of both sexes are collected, and that, too, at an age of extreme levity, and when the youthful mind is prone to the indulgence of a prurient imagination. Says one of the school visitors, 'In most cases in this town the scholars, male and female, are turned promiscuously and simultaneously into the public highway, without the shelter of so much as a *stump* for a covert to the calls of nature. The baneful effects of this barbarous custom on the young and pliant sensibilities are truly lamentable.'"

The Superintendent of the Common Schools of Connecticut, in 1850, holds the following language: "An appalling chapter might be written on the evils, the almost inevitable results of neglecting to provide these indispensable appendages to school-houses in our State. Who can duly estimate the final consequences of the first shock given to female delicacy, from the necessary exposure to which the girls in the public schools are inevitably subjected; and what must be the legitimate results of these frequent exposures during the school-going years of youth? What quenchless fires of passion have been kindled within the bosoms of the young of both sexes by these exposures; fires that have raged to the consuming of personal happiness, to the prevention of scholastic

improvement, and to the destruction of personal character? Again, what disgust has been created in both sexes by not having the appropriate retirements which nature imperiously demands? And, finally, may not the disinclination, the aversion of large numbers of families, of mothers especially, of sending their daughters to the public schools, have been created by the sufferings they themselves have endured from the above cause; and an unwillingness to subject the delicacy of their daughters to the obnoxious trial?"

The evils here so vividly and truthfully pointed out are not confined to the districts where no privies are built, but they apply in an almost equal degree to country districts where one small, mere apology for a privy is furnished. In a majority of cases, a slight building, made of rough boards, is erected, of such a character that it answers no purpose of privacy, and is only useful as a very poor and inadequate screen. It is usually situated directly upon the highway, in close proximity to the school-house, and is hence completely exposed to public observation. Only one building is furnished for the accommodation of the two sexes, so that there can be no surety that the delicacy of young girls will not be outraged by the contact of grossness and brutality. Again, it is usually built with a very shallow vault, with no conveniences and no guards against abuses, and it soon becomes the most offensive and disgusting object in itself that it is possible to conceive, and a positive nuisance to the school and neighborhood. We believe that the picture here given of the condition of our country districts,



and the evils resulting from that condition, are not overdrawn, and that they are of such a character as to demand immediate attention.

In arranging privies for a school, the following principles should always be observed. They should be commodious, and constructed so as to avoid offensive odors as much as possible. They should be placed at a sufficient distance, so that they could never become offensive to the school. They should be screened in some manner from public observation. It will be seen at once that a school lot is necessary to afford a decent location for a privy. As long as school buildings are erected in the street, or upon a lot only large enough to contain the school-house itself, it will be impossible to bring about the wholesome and needed reforms in this respect. There can be no place protected from observation, or where the building itself will not constantly be liable to abuses. In a lot containing an acre, the school-house should be placed in its center, and a high, tight board fence should extend from the center of the rear of the building to the farther edge of the lot, dividing the rear yard into two parts. The privies should be situated near the center of the back part of the respective yards, carefully guarded by screens of wood, or by a living hedge. They should be supplied with large well-stoned vaults, at least six feet deep. If possible, a drain should lead from the vault to a distance, and a stream of running water should be permitted to flow through it. The buildings themselves should be well plastered and painted, and finished in the same general style of architecture as the school-house. The seats



should be provided with lids hung with butts, and all the walls should be left hollow, opening into a ventilating chimney above to carry off the offensive odors. The plaster should be left very rough, and a heavy coat of coarse sand should be mixed with the paint, to render obscene figures and scribbling impossible.

Great care should be taken to so construct the seats that defilement becomes almost impossible. In this matter, however, reference need only be made to that provided for boys, because girls' privies are seldom abused in this way. Besides the lids hung with butts, which should be placed in all privies, in that of the boys a strong brace of plank should be firmly affixed to the frame of the building, so that the covers can not be opened beyond an angle of sixty degrees, thus rendering it impossible to stand upon the seat. In some of the first designs given in this work, a double privy is described, as represented by fig. 1. A high fence separates the entrances to the building, and one vault is made to answer for both. But this arrangement is objectionable—the two portions are so closely together that vulgarity of sound can not be effectually prevented. Although the expense

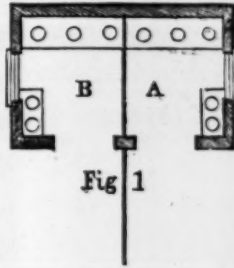


Fig 1

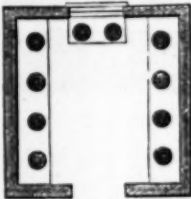


FIG. 2.

is somewhat greater, a double vault is much to be preferred. Fig. 2 represents a privy suitable for the girls' yard. It consists of one apartment, furnished with the requisite number of seats. The size of the building would, of course, some-

what depend upon the size of the school. This building should be finished and painted in a neat manner, and no further trouble may be expected.

The privy for the boys, however, is a more troublesome matter. The difficulty of keeping them clean is well known to every teacher. We apprehend that this trouble arises principally from the fact that urinaries are not provided, and consequently the seats are often wet, and thus rendered unfit to sit upon. Fig. 3 represents a

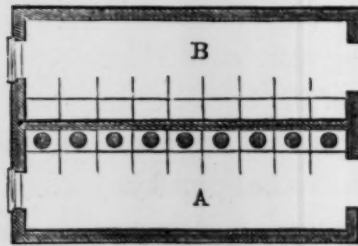


FIG. 3.

privy for boys, arranged to guard against this evil. It is 14 by 10 feet, and divided into two apartments by a close partition. The part A is supplied with seats separated by partitions; and the

part B with a trough in the place of the seats, but is divided into stalls by partitions, in a manner similar to A. This arrangement is such that there can not be the slightest excuse for any abuse of any part of the building, and teachers would have very little difficulty in keeping it scrupulously neat, and free from every kind of defilement and injury.

Locks should be placed upon all the doors of privies, so that they can not be entered except during hours when the teacher can have them under his own personal supervision. When privies are thus perfectly constructed, the teacher should always be held responsible for keeping them in good order. He can do this very easily by personally inspecting the buildings every day, and

promptly noticing the very first violation of the rules of decency and good order. In doing this the teacher will accomplish a great incidental good, by teaching habits of decency and modesty, and by repressing all exhibitions of grossness. He may also inculcate important hygienic laws in this connection, which will be of the greatest importance to the pupil through life. It is the custom of many excellent teachers, principals of some of our most noted union schools, to frequently look into the privy while the boys are in it, thus rendering the abuse very difficult, and its detection almost certain. In this way all the outbuildings of the school are kept as fastidiously neat as those connected with our best private houses. Let all interested in schools contrast such a state of things with that usually found in country districts, and then decide whether the advantages gained would not greatly outweigh the extra expense incurred.

## CHAPTER IV.

### ARRANGING AND ORNAMENTING GROUNDS.

AMPLE school grounds are needed for a great variety of purposes; and when the philosophy of instruction shall be fully understood, large yards will be considered indispensable as affording opportunities for physical exercise, and for displaying the beauties of nature. Physical education is now too often neglected, and, indeed, the circumstances and surroundings of the majority of our schools are such that a regular course of physical discipline is impossible. The necessity and importance of exercise are forcibly expressed in the following extract from "The Family Gymnasium," by Dr. Trall:

"It is as natural for a child to exercise as to breathe. When unrestrained, nearly all children are distinguished for restless activity. Nature bids them exercise, and they obey the mandate, often in spite of ignorant parents, nurses, and teachers, who scold and whip them for restlessness. Teachers are often more disposed to consult their own convenience than to study the laws of nature as applicable to their young charge; and, by dint of praising quietness and blaming activity, the poor child's

nature is smothered ; and pale cheeks, diminutive muscular development, weakness, dyspepsia, consumption, and death are the fruits of the oft-repeated command, 'Keep quiet.'

"Exercise is as essential to development as air is to life. No person can acquire a large, compact, muscular organization without it.

"'But you would not have girls run and romp over hill and dale, and laugh boisterously, like boys?' Let us examine the subject, and see what Nature, the great teacher, will say concerning it. Do young female animals frisk, jump, and play like males ; and do little girls instinctively laugh loudly, and run and play like boys? If so, we may safely infer that Nature has established the same general law of exercise—not for animals merely, but for both sexes of the human race.

"Rousseau observes: 'If you wish to develop the mind of a pupil, develop the power which mind has to govern—exercise his body, make him healthy and strong, that you may make him prudent and reasonable.'

"Systematic gymnastic exercises, which give energy and precision to muscular movements, are not only useful in the development of bodily vigor, but are also efficient auxiliaries in mental education by inducing habits of order, exactness, and directness in the mental operations."

To render this systematic exercise possible, there must be considerable space ; and it will be seen that this space is not designed for mere amusements, but in reality becomes one of the most important educational auxiliaries. The ground devoted to play and exercise should be free



from obstructions, and hence trees, flower-beds, etc., would be out of place in that portion of the school-yard. In yards attached to village and union schools, these playgrounds might be furnished with a variety of gymnastic apparatus; but in country districts generally, such apparatus will be unnecessary, as the earnest, hearty plays indulged in will furnish a sufficient amount of exercise for every muscle in the body. Teachers should thoroughly understand the whole science and art of physical development, so as to be able to encourage the adoption of such plays as will be most likely to secure the desired result.

Having made the best possible disposition of the school-buildings, and secured the desired open spaces for playgrounds, the subject next to consider is that of "ornament." While answering strictly utilitarian purposes, the whole grounds may be so arranged as to become strong educational influences; first, by being attractive to the pupils; second, by affording them constant pleasure during their school-days; and third, by cultivating in them a taste for the beautiful in nature. For the purposes of ornament, trees are at once the most beautiful and the most enduring. They can be procured at a very trifling cost, wherever school-houses are built, and, unlike most of things connected with schools, they increase in value and beauty each successive year, nature assuming the cost, and lavishing upon them her rarest beauties of color and form. A. J. Downing, the great lover of nature, in his work upon "Landscape Gardening," thus speaks of trees and of their influence upon the mind:



"A tree, undoubtedly, is one of the most beautiful objects in nature. Airy and delicate in its youth, luxuriant and majestic in its prime, venerable and picturesque in its old age, it constitutes in its various forms, sizes, and developments, the greatest charm and beauty of the earth in all countries. The most varied outline of surface, the finest combination of picturesque materials, the stateliest country house would be comparatively tame and spiritless without the inimitable accompaniment of foliage. Let those who have passed their whole lives in a richly-wooded country—whose daily visions are of deep, leafy glens, forest-clad hills, and plains luxuriantly shaded—transport themselves for a moment to the desert, where but a few stunted bushes raise their heads above the earth; or to those wild steppes where the eye wanders in vain for some 'leafy garniture'—where the sun strikes down with parching heat, or the wind sweeps over with unbroken fury, and they may, perhaps, estimate, by contrast, their beauty and value.

"Wood, in its many shapes, is then one of the greatest sources of interest and character in landscapes. Variety, which we need scarcely allude to as a fertile source of beauty, is created in a wonderful degree by a natural arrangement of trees. To a pile of buildings, or even of ruins, to a group of rocks or animals, they communicate new life and spirit, by their irregular outlines, which by partially concealing some portions, and throwing others into stronger light, contribute greatly to produce intricacy and variety, and confer an expression, which without these latter qualities might in a great measure be wanting.

By shutting out some parts and inclosing others, they divide the extent embraced by the eye into a hundred different landscapes, instead of one tame scene bounded by the horizon.

"The different seasons of the year, too, are inseparably connected in our minds with the effects produced by them on woodland scenery. Spring is joyous and enlivening to us, as nature then puts on her fresh livery of green, and the trees bud and blossom with a renewed beauty, that speaks with a mute and gentle eloquence to the heart. In summer they offer us a grateful shelter under their umbrageous arms and leafy branches, and whisper unwritten music to the passing breeze. In autumn we feel a melancholy thoughtfulness as

‘We stand among the falling leaves,’

and gaze upon their dying glories. And in winter we see in them the silent rest of nature, and behold in their leafless spray and seemingly dead limbs an annual type of that deeper mystery—the deathless sleep of all being.

"By the judicious employment of trees, we may effect the greatest alterations and improvements within the scope of landscape gardening. Buildings which are tame, insipid, or even mean in appearance, may be made interesting, and even picturesque, by a proper disposition of trees. Edifices, or parts of them, that are unsightly, or which it is desirable partly or wholly to conceal, can readily be hidden or improved by wood; and walks and roads, which otherwise would be but simple ways of approach from one point to another, are, by an elegant arrangement of trees on their margin, or adjacent to them,

made the most interesting and pleasing portions of the residence."

There is an opportunity for the exercise of a great diversity of tastes, both in selecting and in arranging trees for ornamenting school grounds. In selecting, the following principles should be taken as guides: First, such trees should be chosen as will harmonize with the general features of the landscape. For example: in a hilly or very broken region the tall, spiry-topped trees, like the pine, fir, spruce, and hemlock, would be in keeping with the natural scenery, but upon a wide, extended plain, they would appear comparatively mean and incongruous. The round-topped and symmetrical trees, like the oak, maple, and beech, are much better adapted to the quiet scenery of a level region than to the irregular outlines of a rough, mountainous surface. Second, the different varieties of trees selected should harmonize with each other. Although a variety is always desirable, yet the different kinds chosen for any given spot or group should be somewhat similar in shape, so as not to present too great a contrast. For example, a group consisting of a maple, beech, and oak would be harmonious, while one consisting of a Lombardy poplar, weeping willow, and fir would be perfectly incongruous.

For different purposes, also, different trees are to be chosen. Some are selected to border an avenue or path, and some for mere shade; some are to be placed singly, and some disposed in groups; and different varieties of trees are particularly adapted to each case. For single trees, where there is to be left sufficient space for their

entire expansion, in a level or moderately hilly region, there is no tree in grace or beauty can surpass the drooping elm. The maple is a noble tree, and is admirably adapted for either a situation as a single tree, or as a member of a group. The oak and chestnut are among the largest and noblest of all our trees, and either may be taken for the central object of a group. The weeping willow appears best as a single tree, and in a level tract of country. The spruce, hemlock, ash, and beech, from our common forests, all make beautiful shade trees. Among other shade trees that can be easily procured in some sections of the country are the horse-chestnut, locust, and hickory, the magnolia and cottonwood of the Southern States, and the buckeye and black walnut of the West. The soft maple is highly valued as an ornamental tree, on account of its red blossoms of early spring, its dense green foliage in summer, and its beautiful dress of deep crimson after the first frost of autumn. To conclude, there is scarcely a tree of our forests that would not become a beautiful ornament, if transplanted and nurtured with proper care.

The arrangement of trees should be the subject of careful study. They are usually set out in straight rows, without any regard to beauty of grouping, and effecting no result except that of furnishing shade. The stiff formality of their position goes far to destroy the effect of their beautiful outlines, and thus the most important objects of their culture are lost. When we bring into immediate contrast the stateliness and formality of an estate planted with trees in straight rows, with a natural land-

scape, with trees and groves promiscuously scattered over it, we can at once appreciate the immeasurably superior beauty of the latter scene over the former.

Trees should be planted singly or in groups. Single trees should be such as have a graceful and beautiful outline, and convey to the mind the feeling of completeness, as the drooping elm, weeping willow, and horse-chestnut. Groups may consist of several kinds of trees, that are harmonious in character, planted so closely together that at a little distance they have the appearance of a single object. They should always be composed of one principal tree, larger and taller than the rest, with the others grouped around it as subordinates.

These single trees and groups should be so disposed about the school premises as not to interfere with the play grounds, and at the same time to produce as great a variety as possible in the appearance of the landscape. If the situation is a fine one, openings should be left to afford views of distant objects, such as a lake, river, or mountain, all of which objects will appear much more beautiful seen through a vista, bounded by the shifting foliage and waving branches of the trees.

Shrubs that are commonly used for hedges should also be thickly planted in gracefully curved lines, in such a manner as to completely screen the approach to the out-buildings, and to cover up such portions of the buildings as should not be exposed to public gaze. Flowers might also be cultivated to a limited extent, but, as a general thing, they would not receive sufficient attention in our country districts to insure their successful culture.



School grounds arranged in this manner would become great powers of refinement and important influences for good. When trees are once planted, the winds, the sun, and the rains carefully and assiduously nurture them, supplying their every want, and converting their puny stalks into giant forms, until

"They stand massy, and tall, and dark,  
Fit shrine for humble worshiper to hold  
Communion with his Maker."

The first school impressions of childhood would be associated with their graceful outlines, the waving of their branches, and the struggling of light down through green leaves. Lessons of wisdom and beauty, which would endure forever, could be continually gathered from their trunks, their leaves, and their blossoms. The men that planted them would perform a work directly aiding in the elevation of humanity, and long after their forms have moldered in the dust, whole generations of children would "rise up and call them blessed."



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Fig. 1.

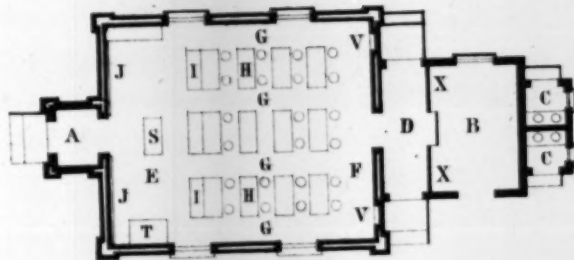


Fig. 2.

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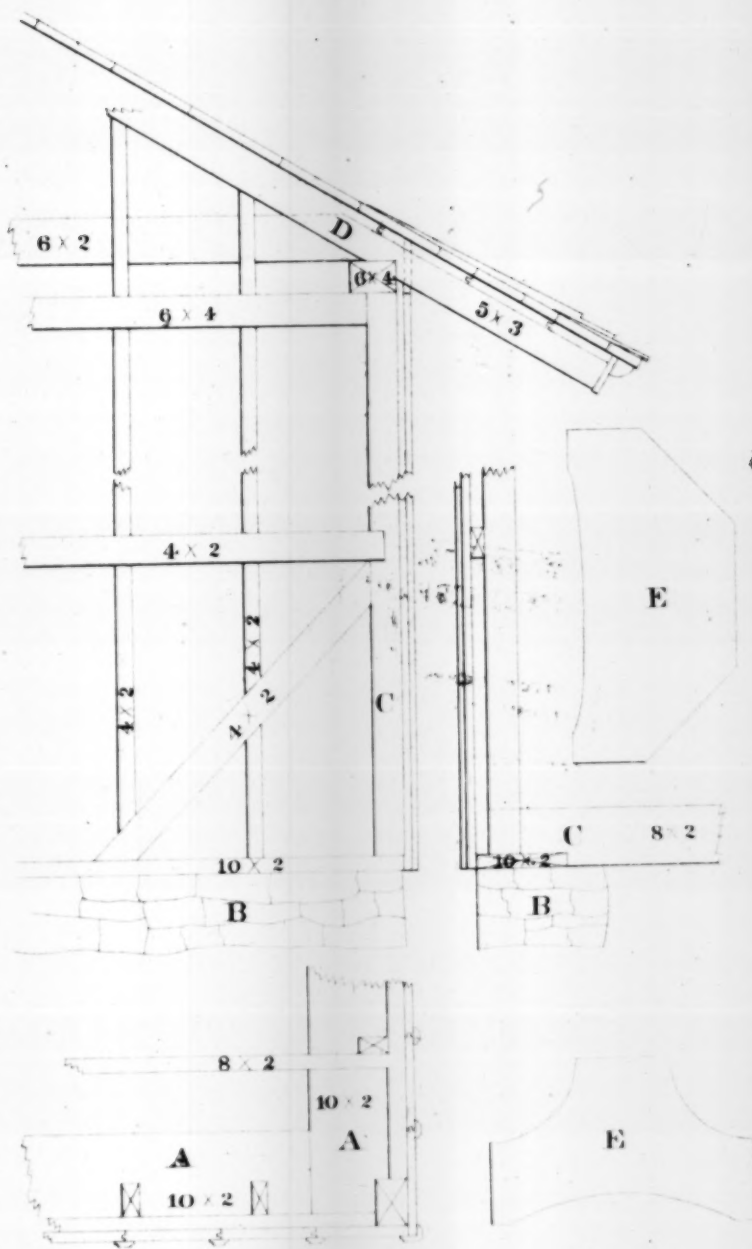


Fig. 3.

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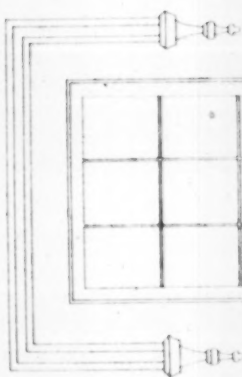
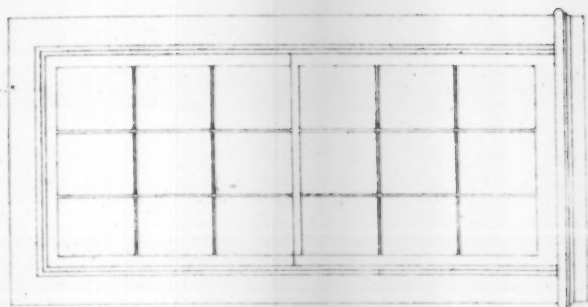
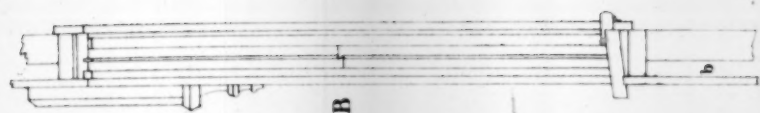


Fig. 4.

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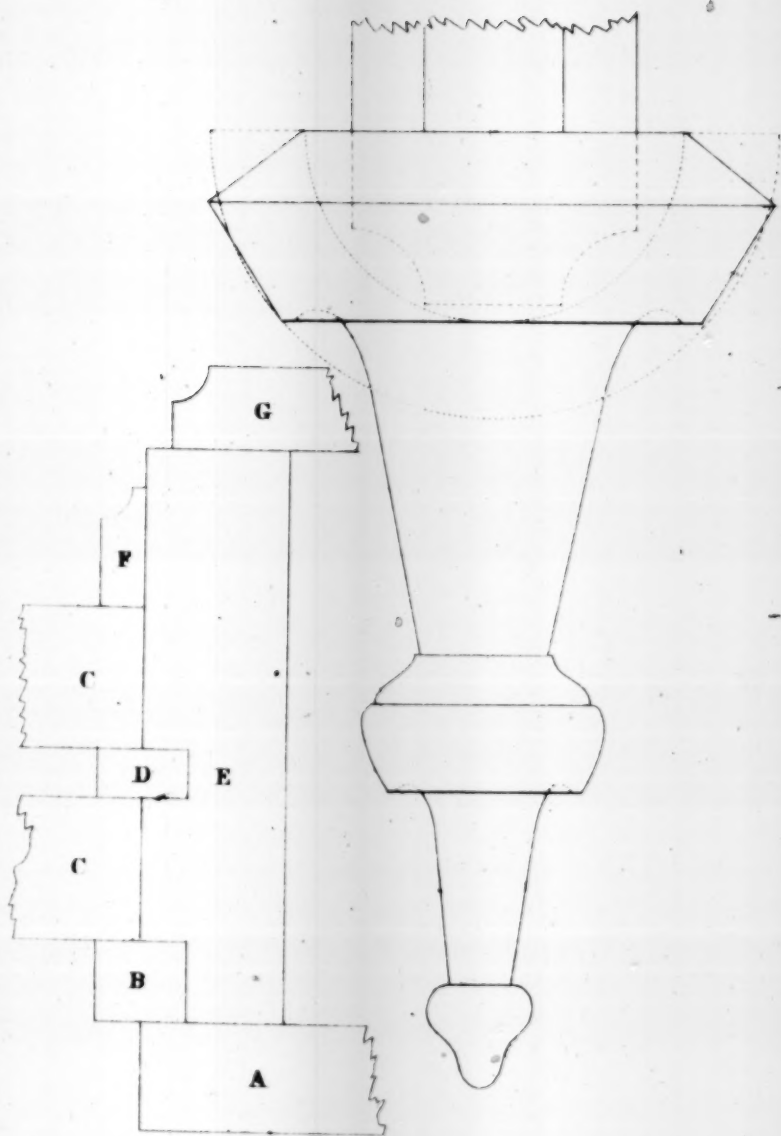


Fig. 5.



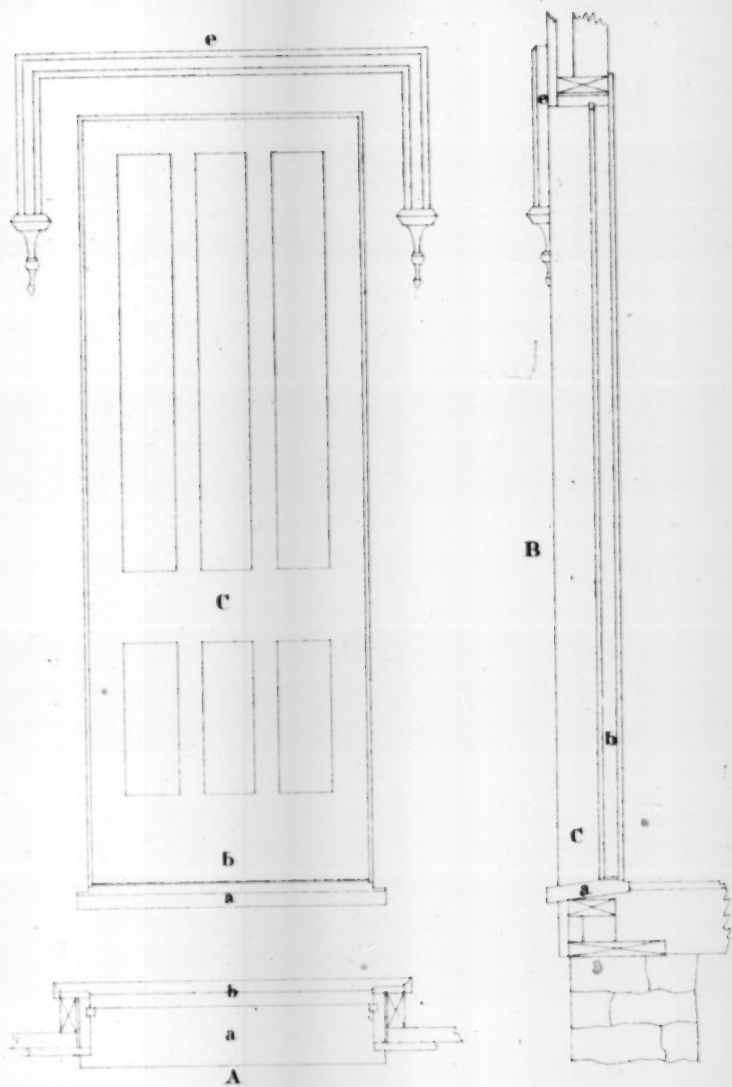


Fig. 6.



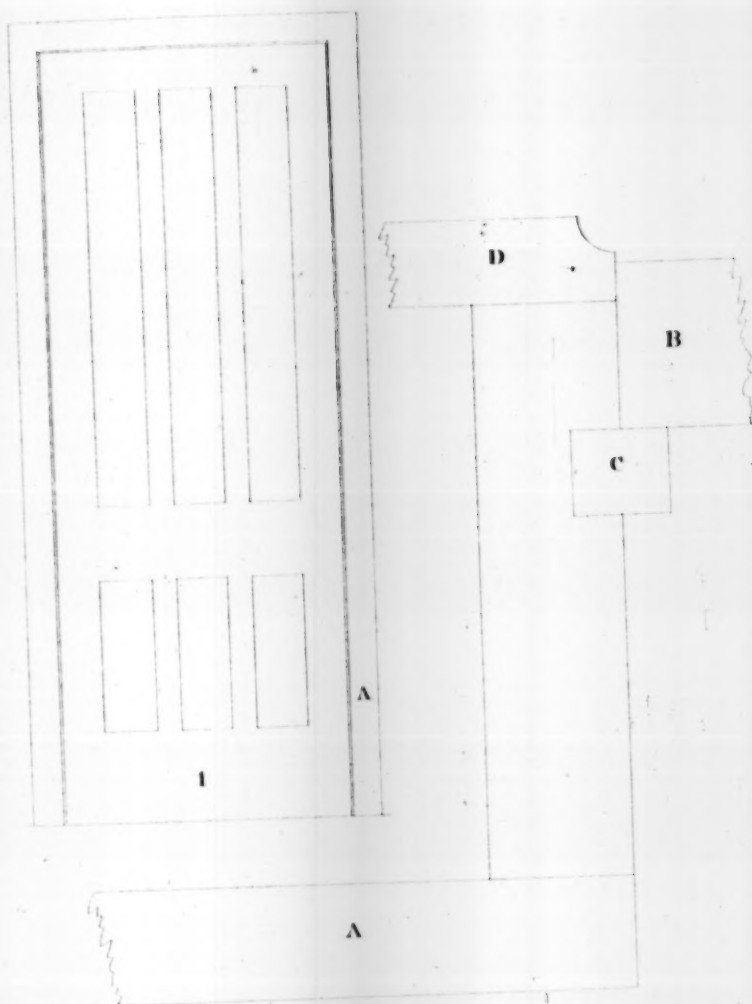


Fig.7.





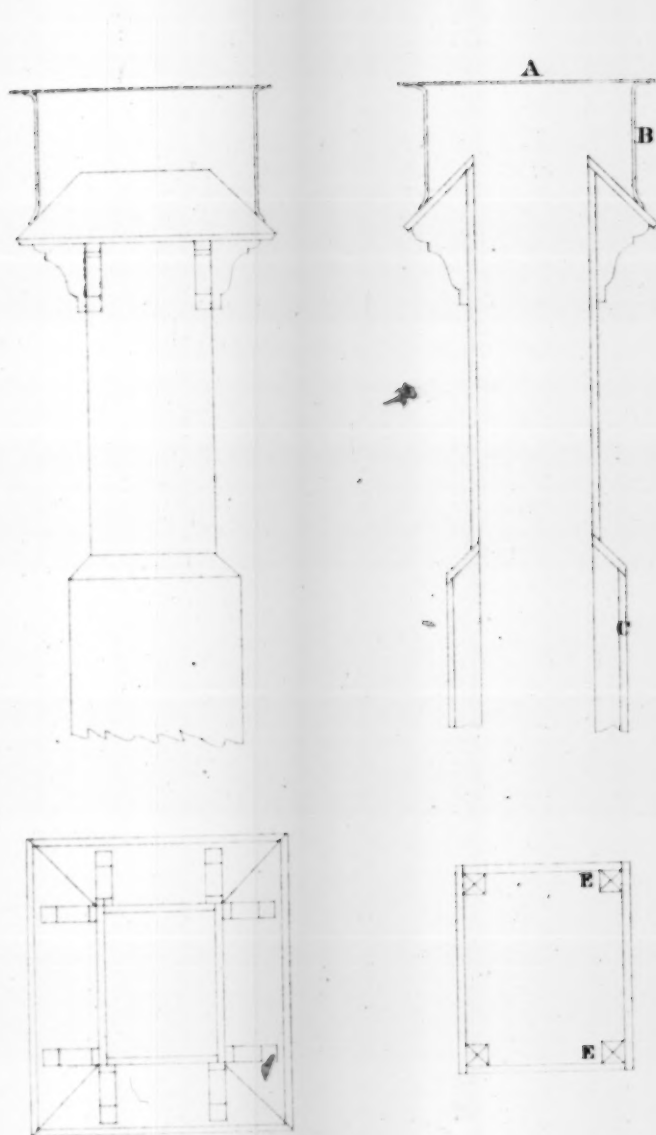


Fig. 8.

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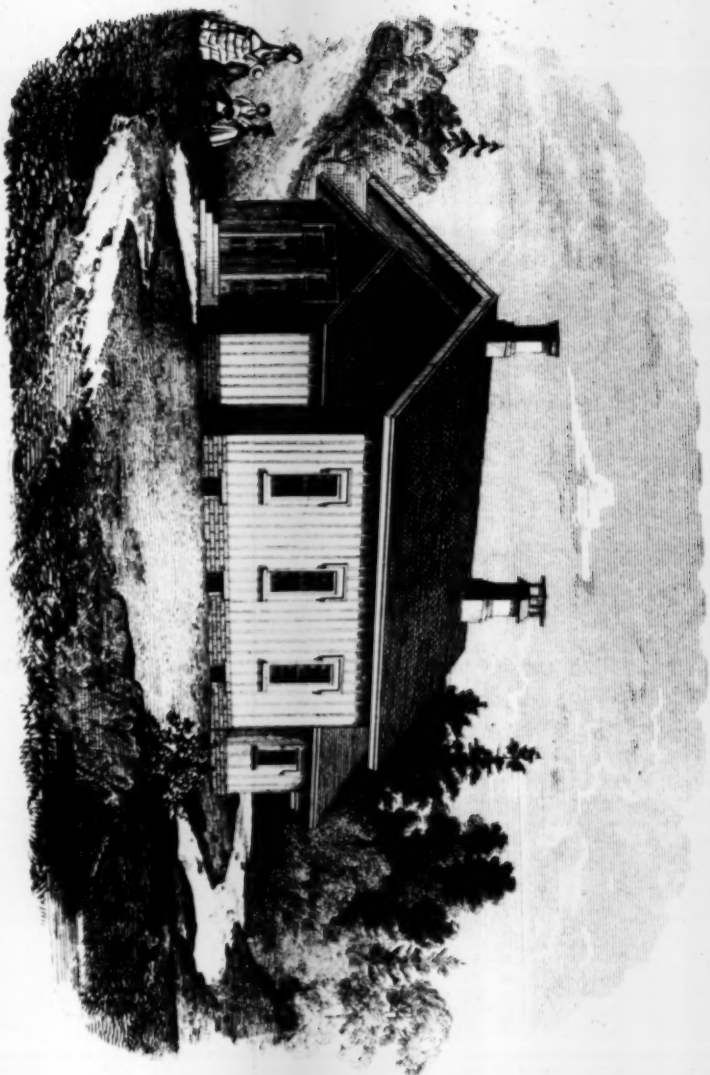


Fig. 9.

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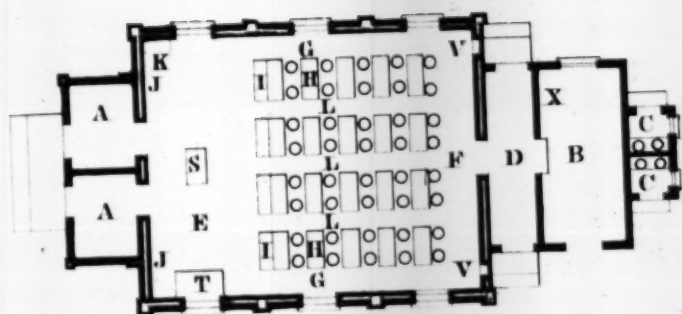


Fig. 10.

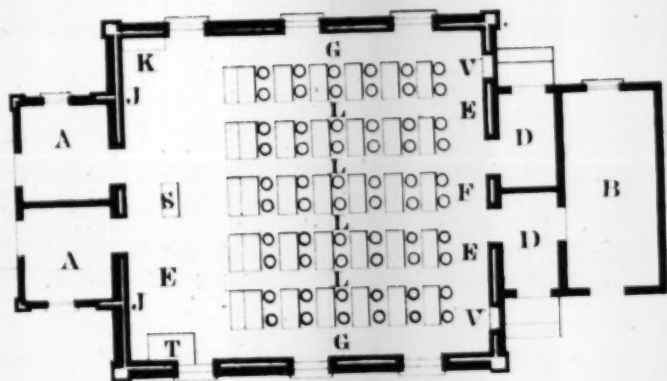


Fig. 12.

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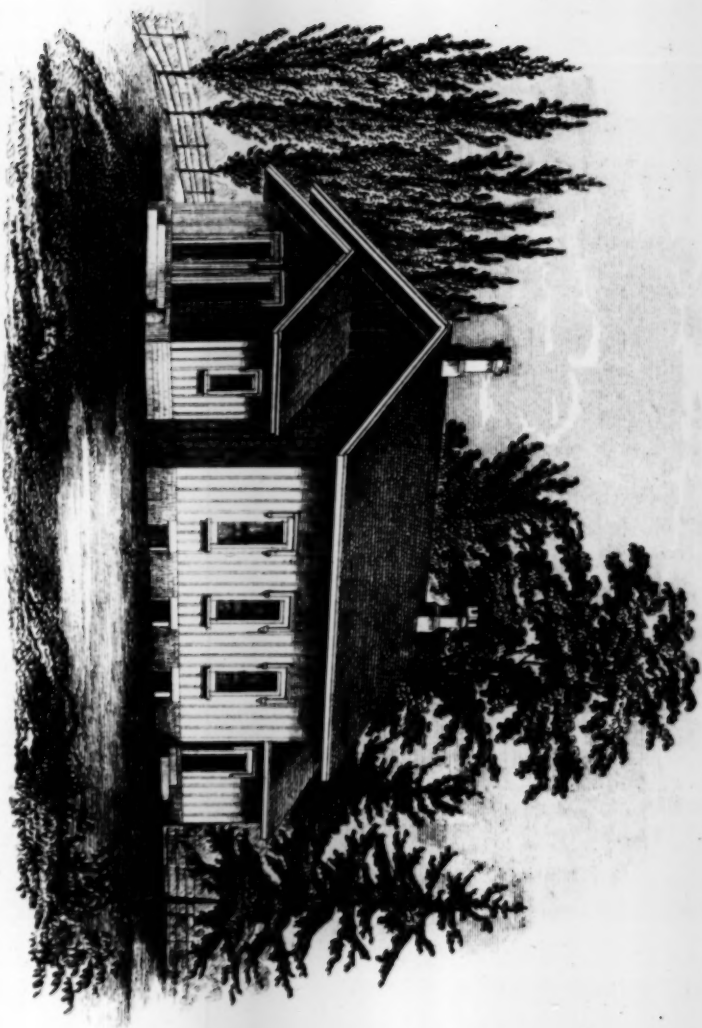


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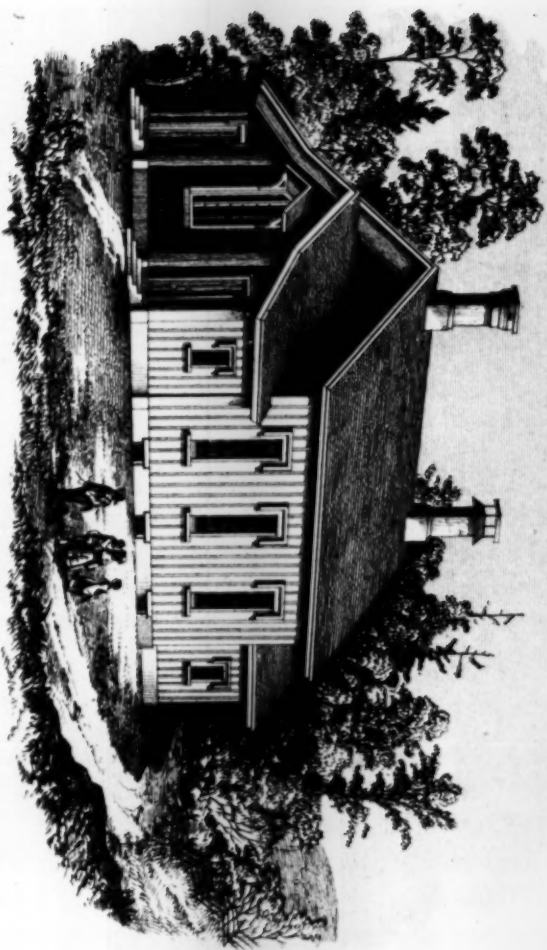


Fig. 13.



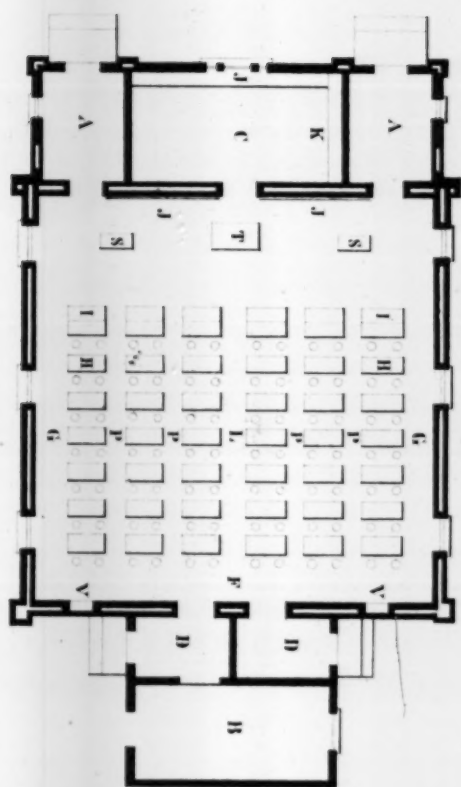
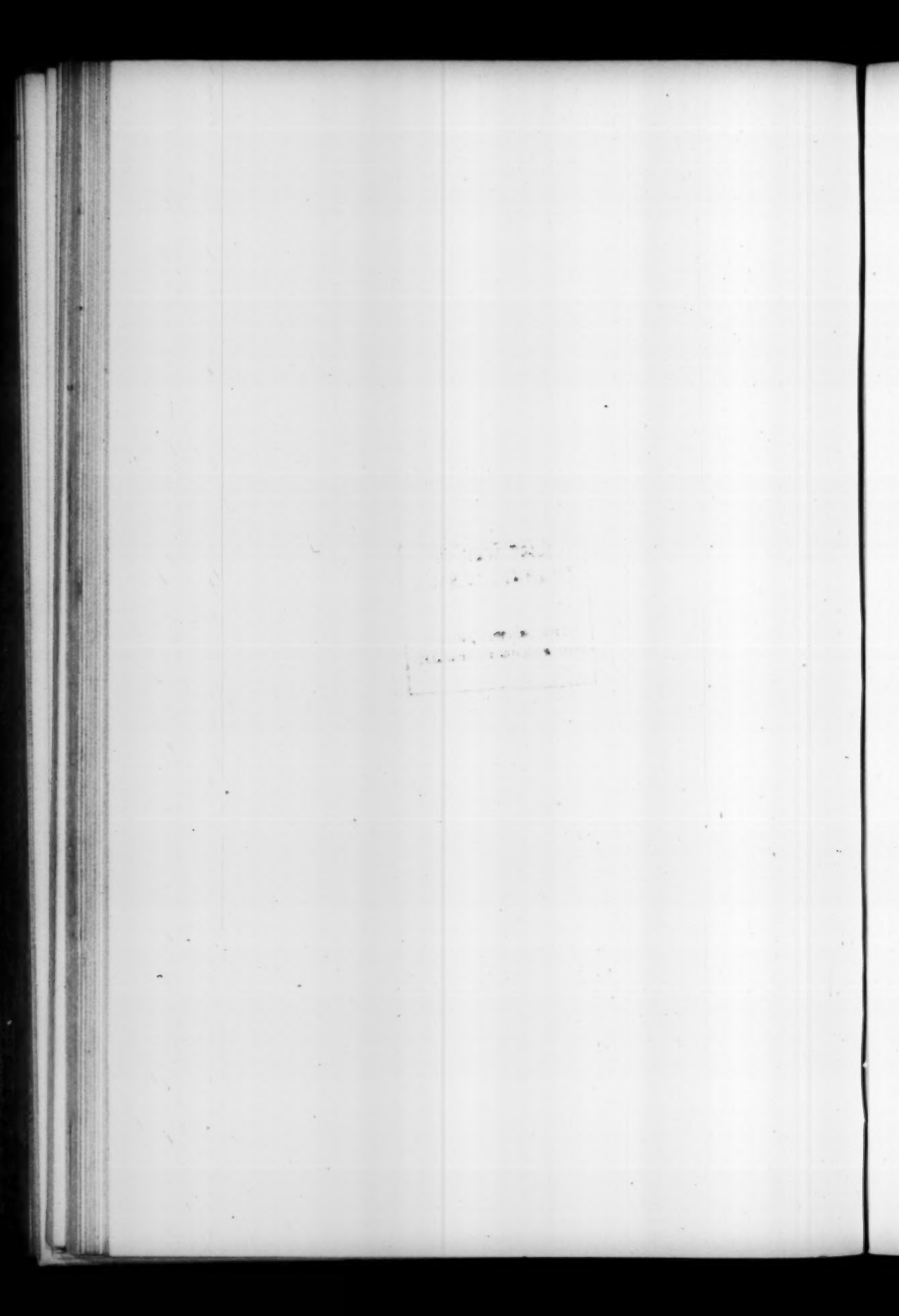


Fig. 1b.





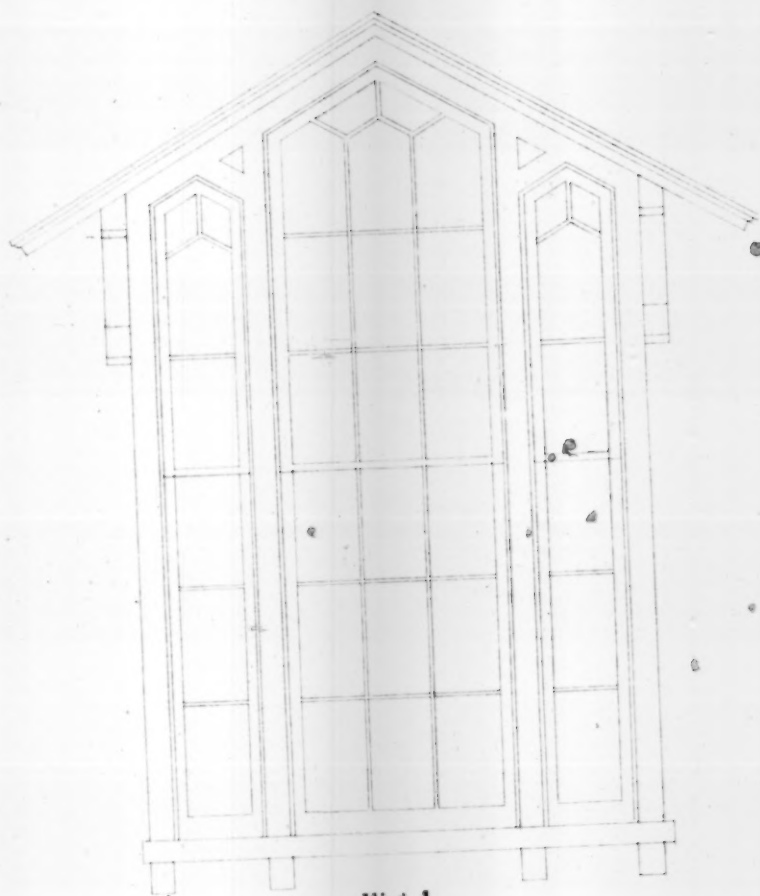


Fig. 1.

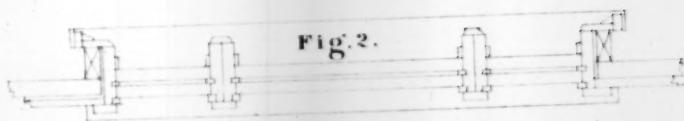


Fig. 2.

Fig. 15.

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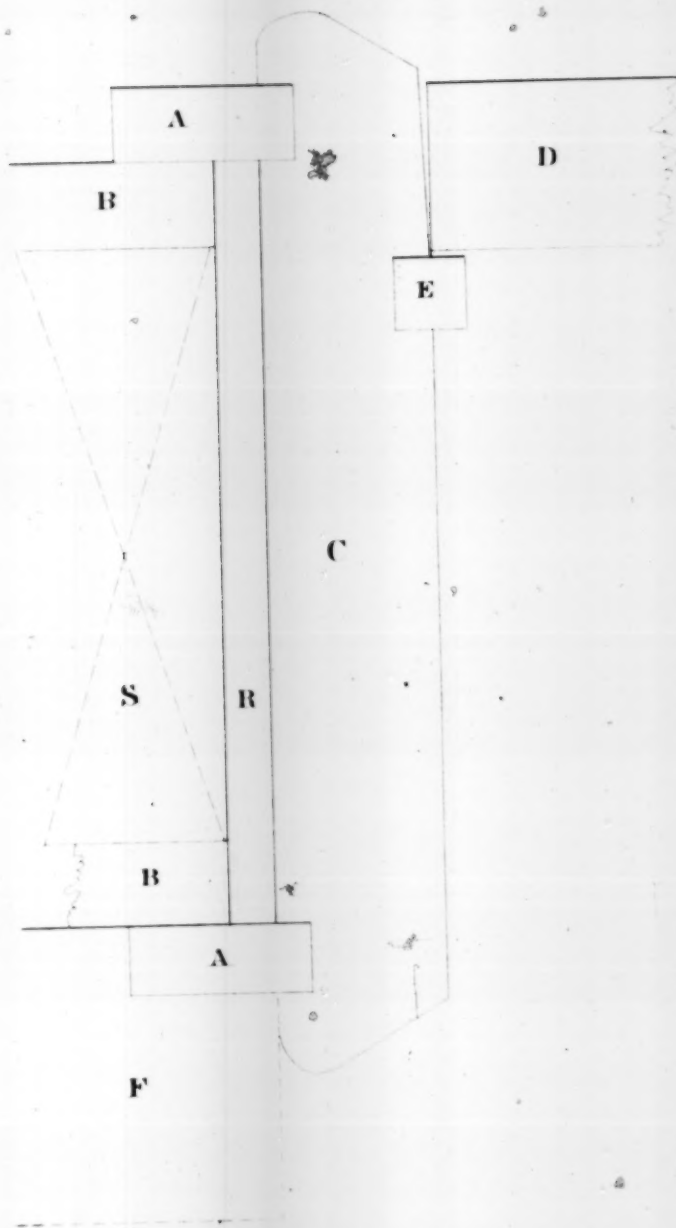


Fig. 16.

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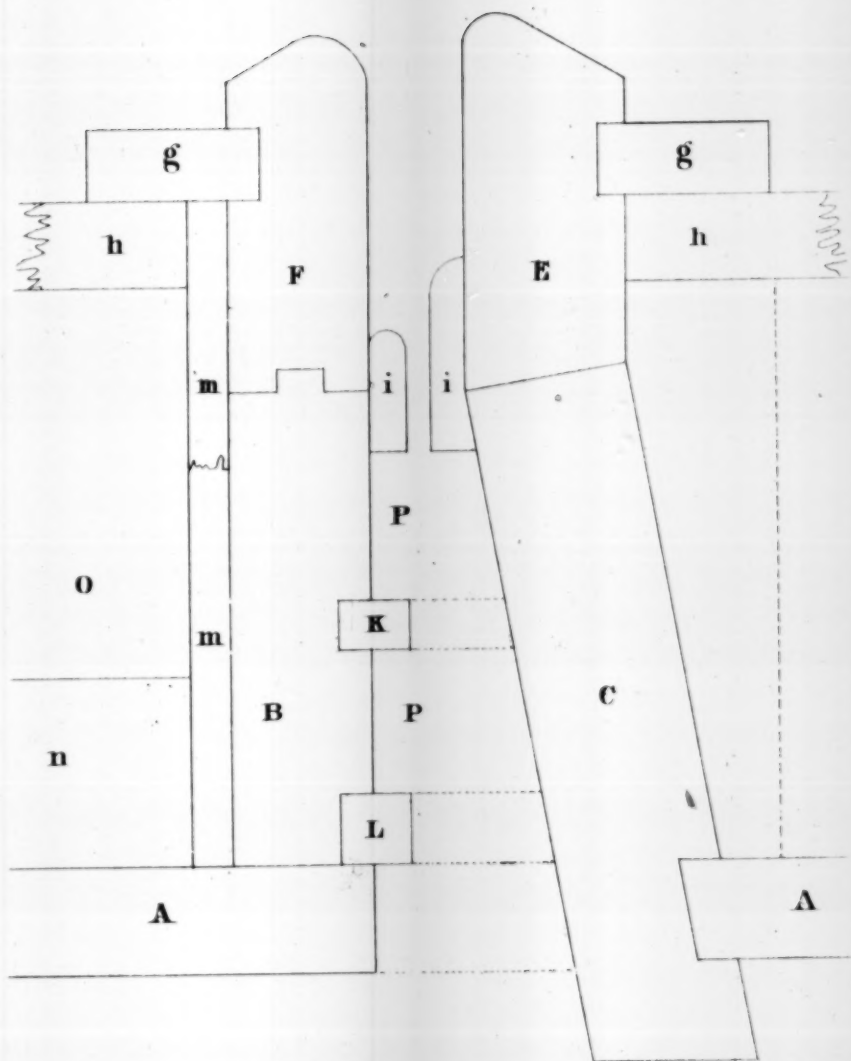


Fig. 17.

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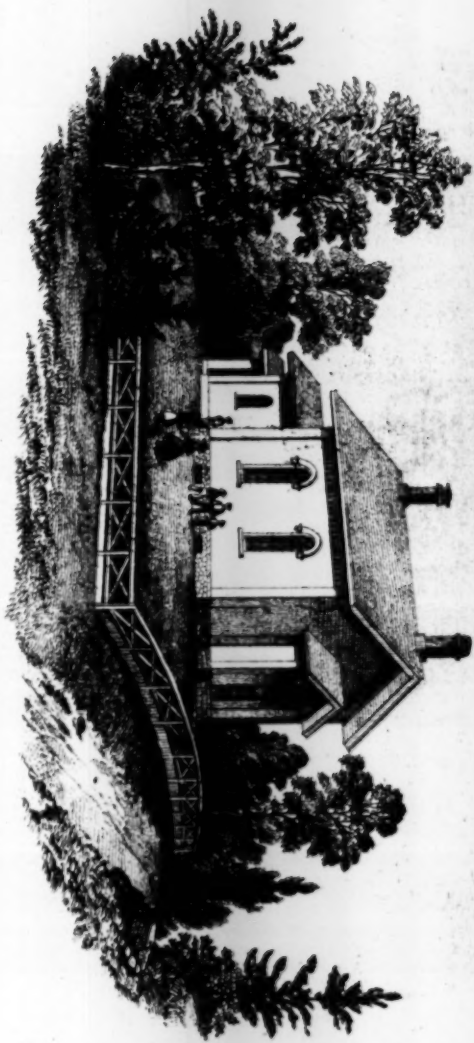


FIG. 18.

NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

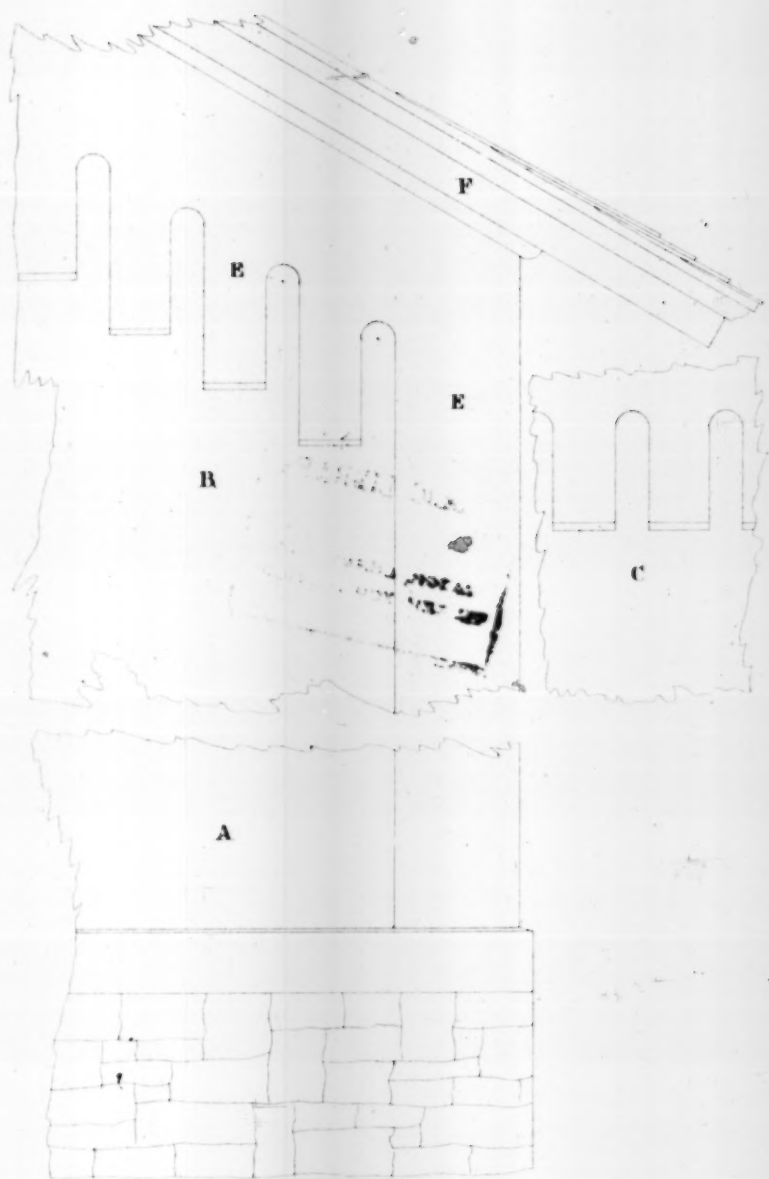


Fig. 19.

NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

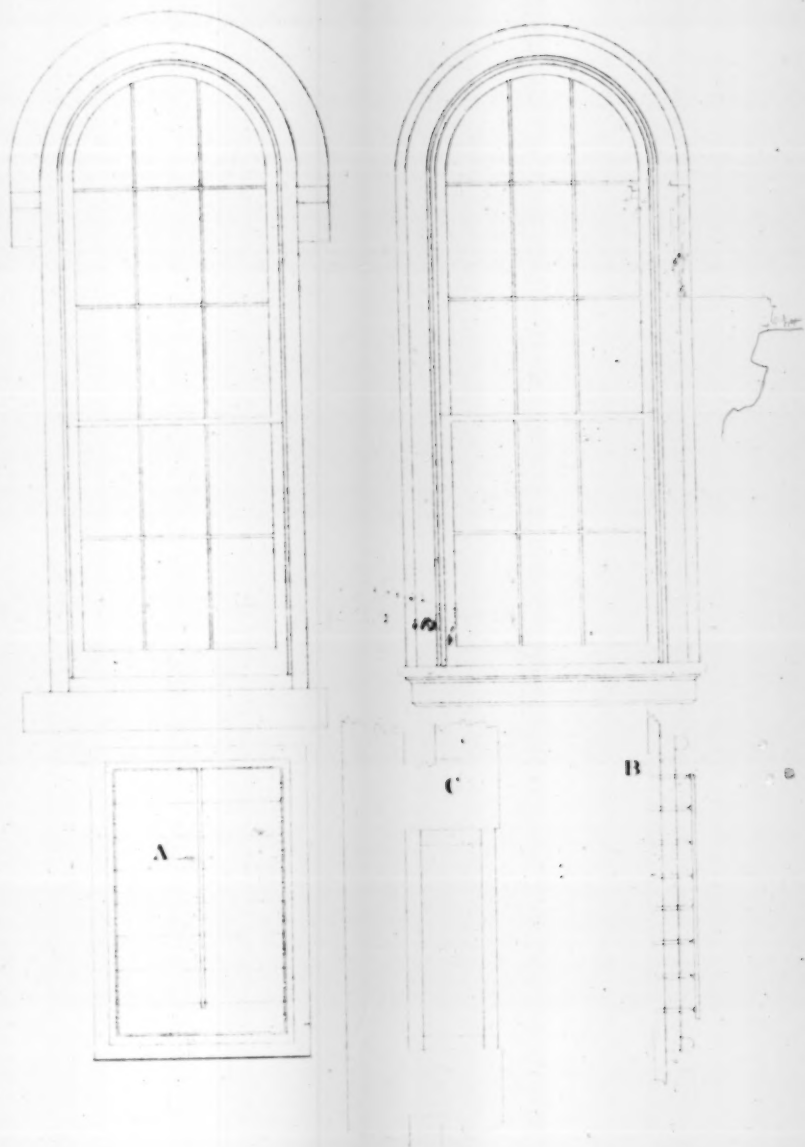


Fig. 20.

ASTOR, LENOX AND  
TILDEN FOUNDATION



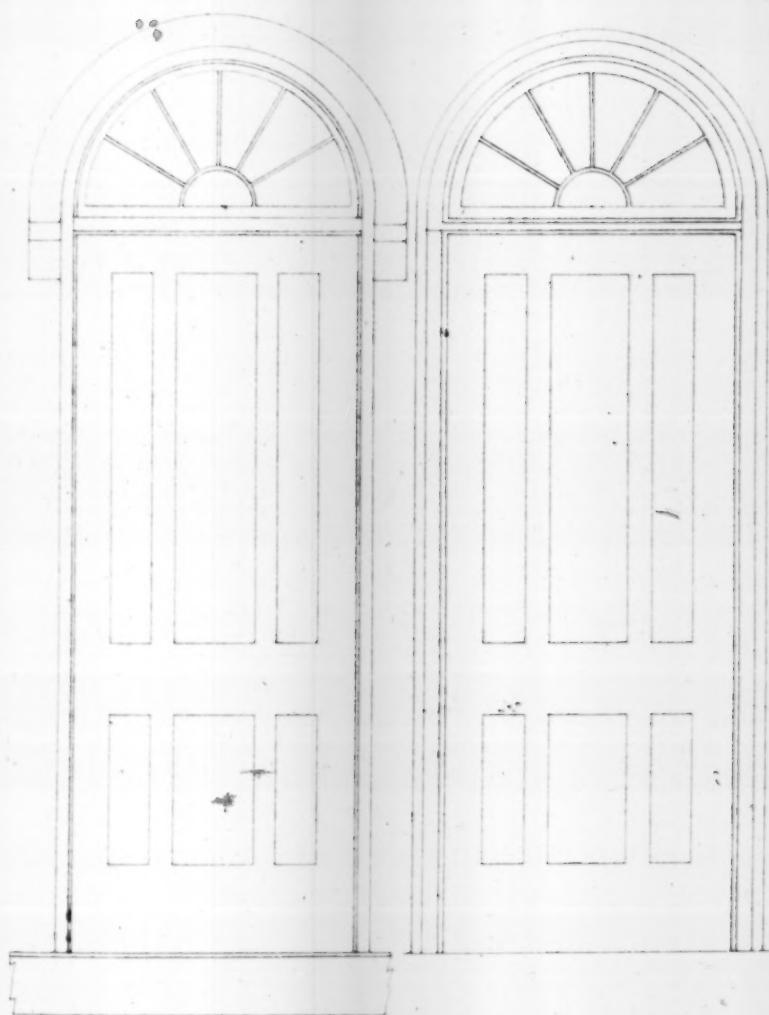


Fig. 21.

ASTOR, LENOX, TILDEN  
LIBRARY

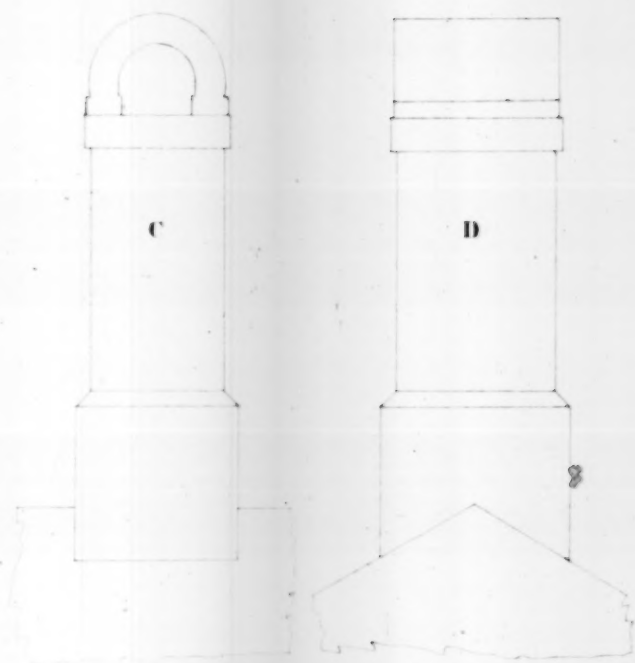
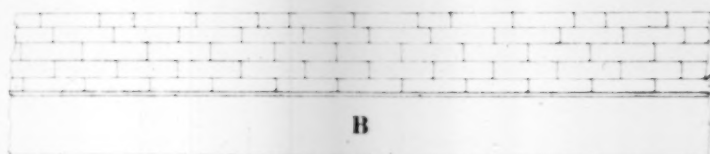
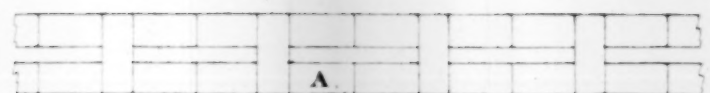


Fig. 22.

ALB. 1880  
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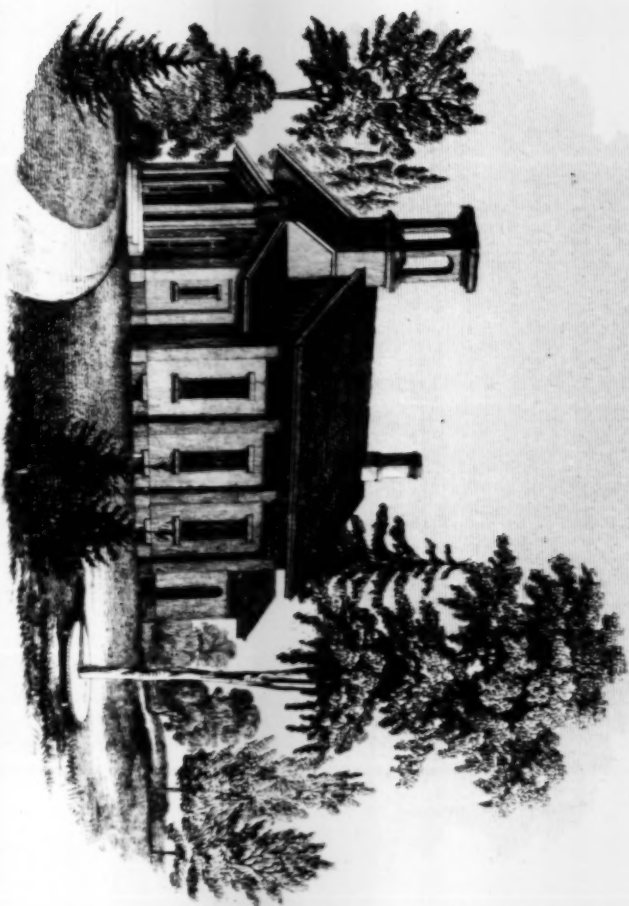


Fig. 23.

THE  
LIBRARY  
OF THE  
MUSEUM OF  
ART AND  
ARCHAEOLOGY  
OF THE  
UNIVERSITY OF  
CAMBRIDGE

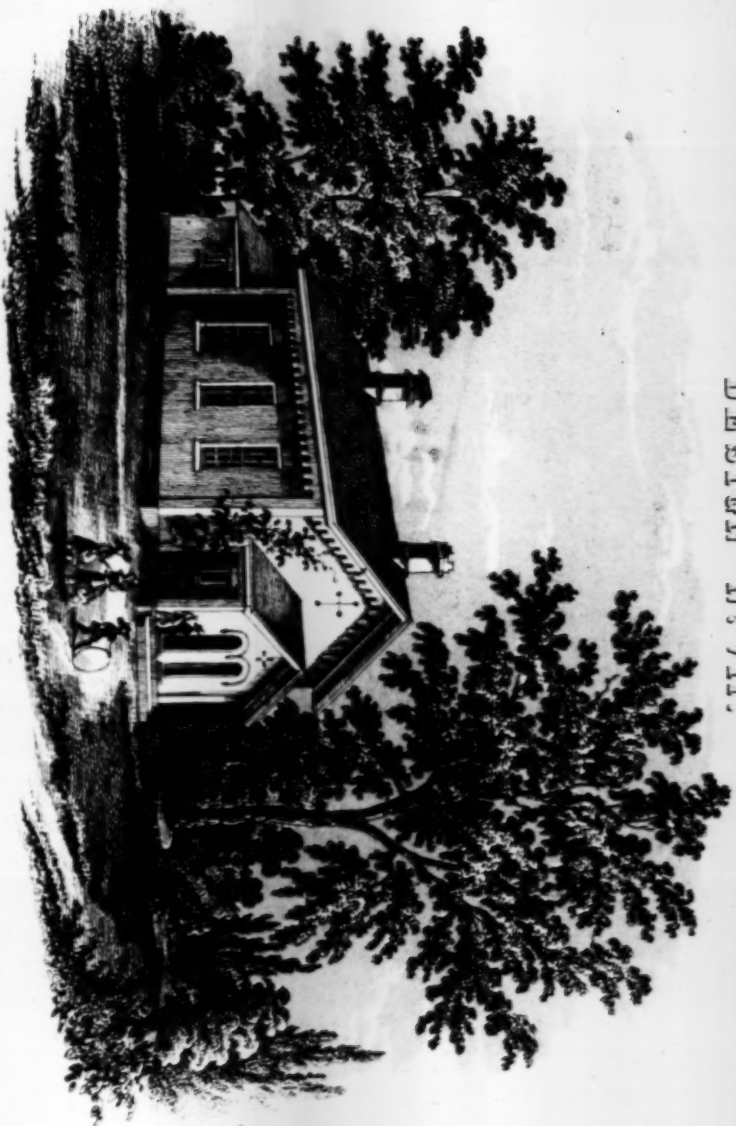




Fig. 24.

1871  
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DESIGN No. VII.



TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

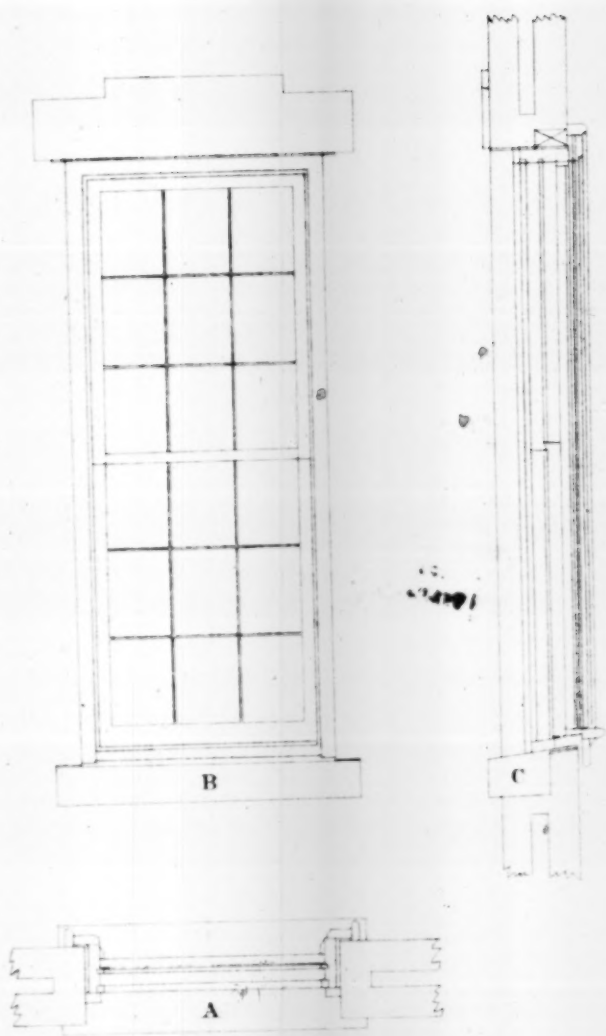


Fig 26.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



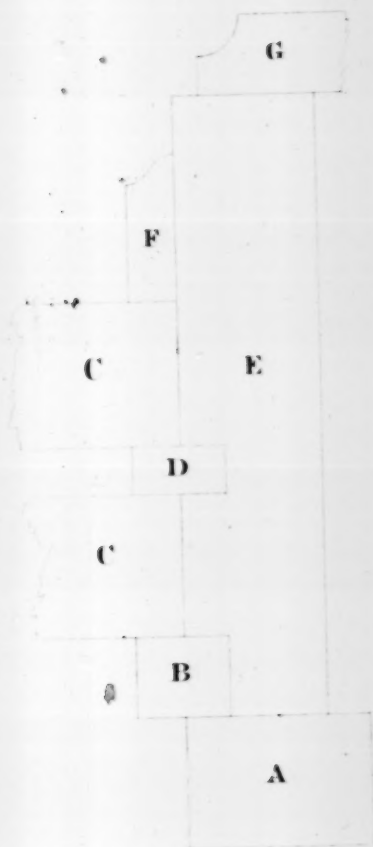
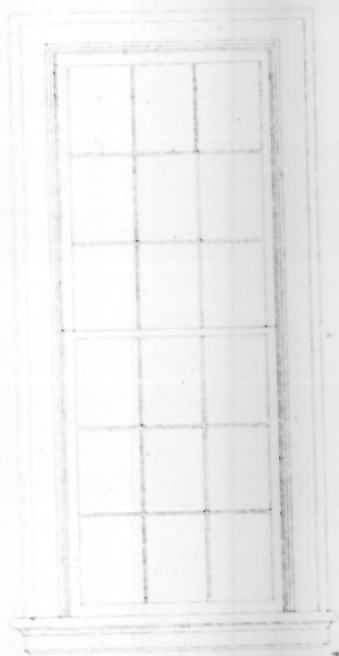


Fig. 27.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

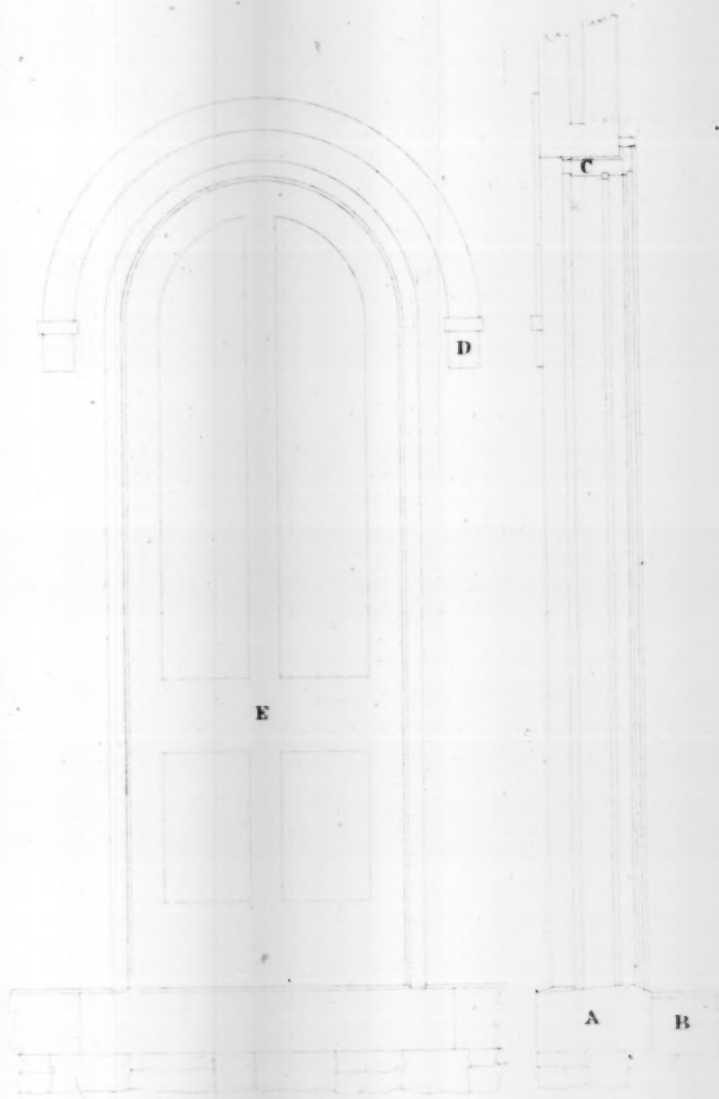


Fig. 28.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

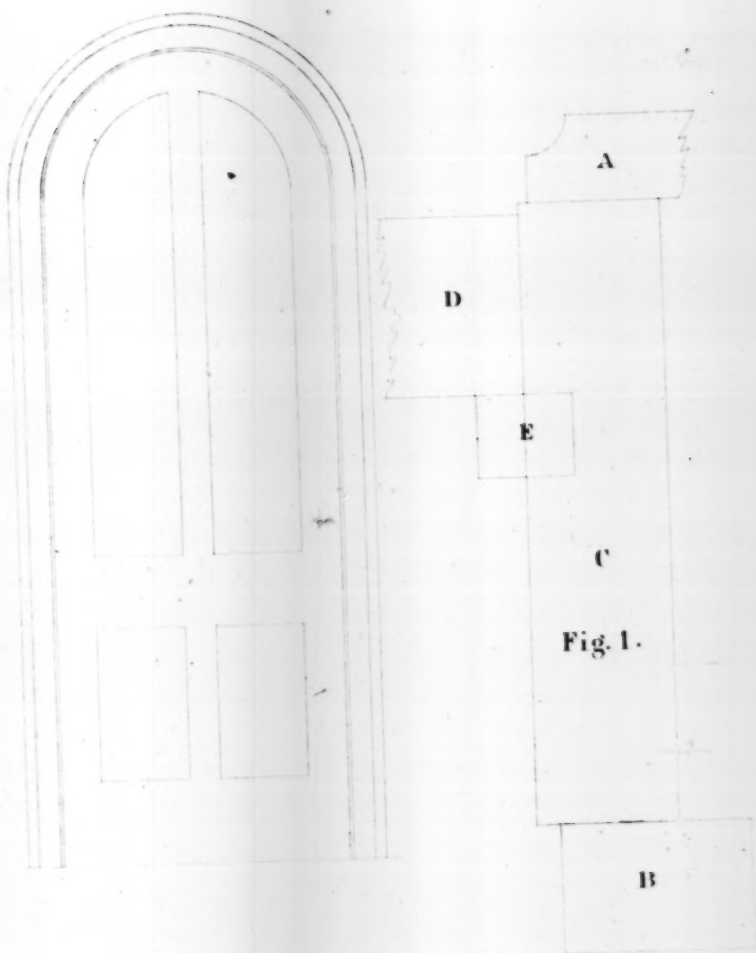


Fig. 29.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



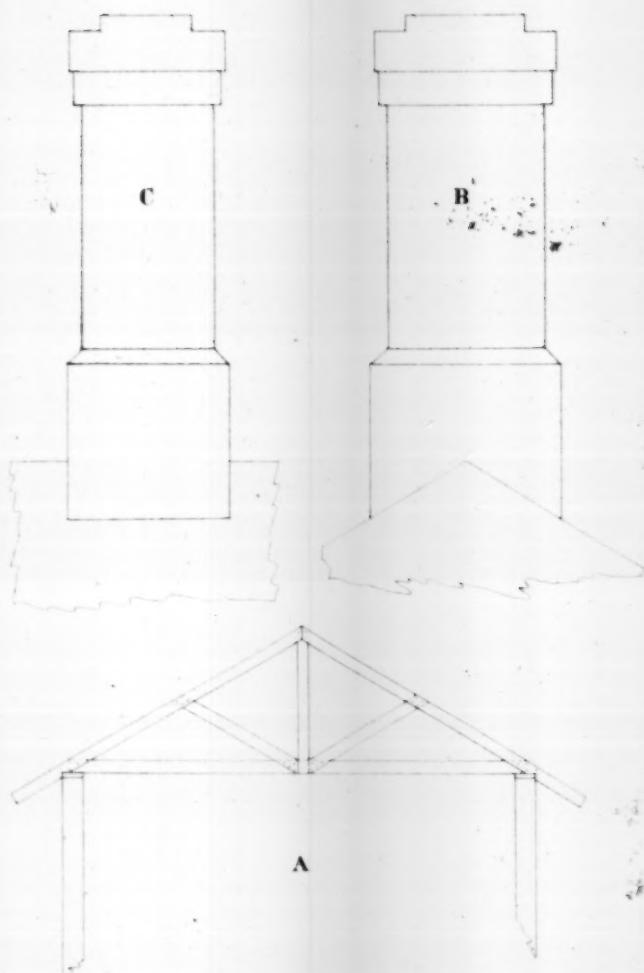


Fig.30.

NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

MESSENGER, N.Y.

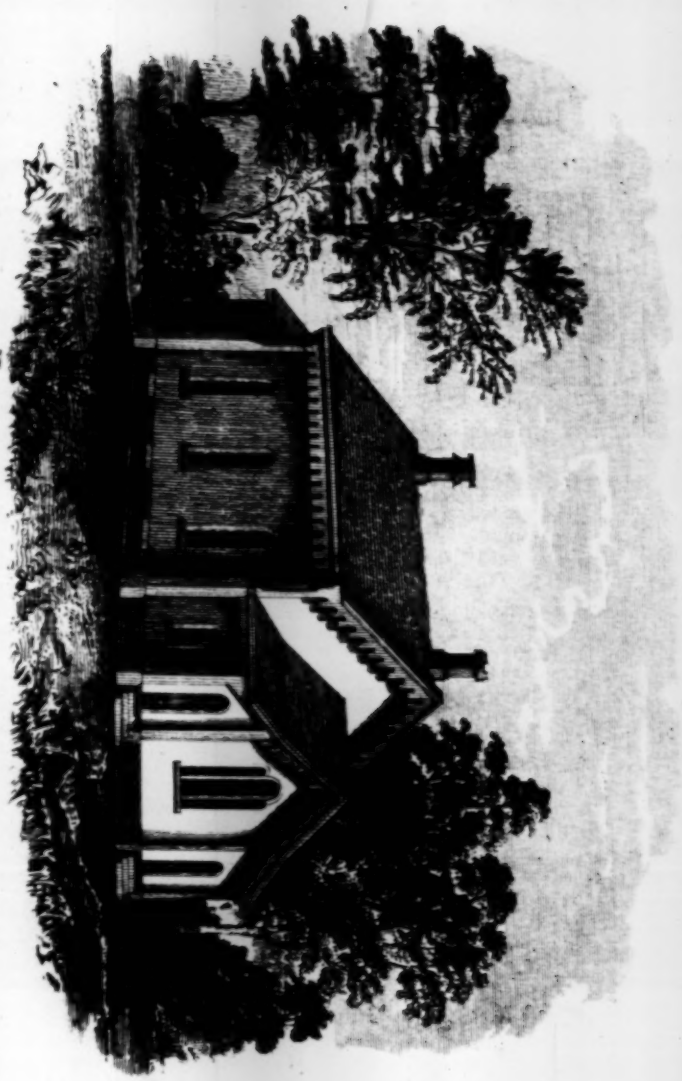
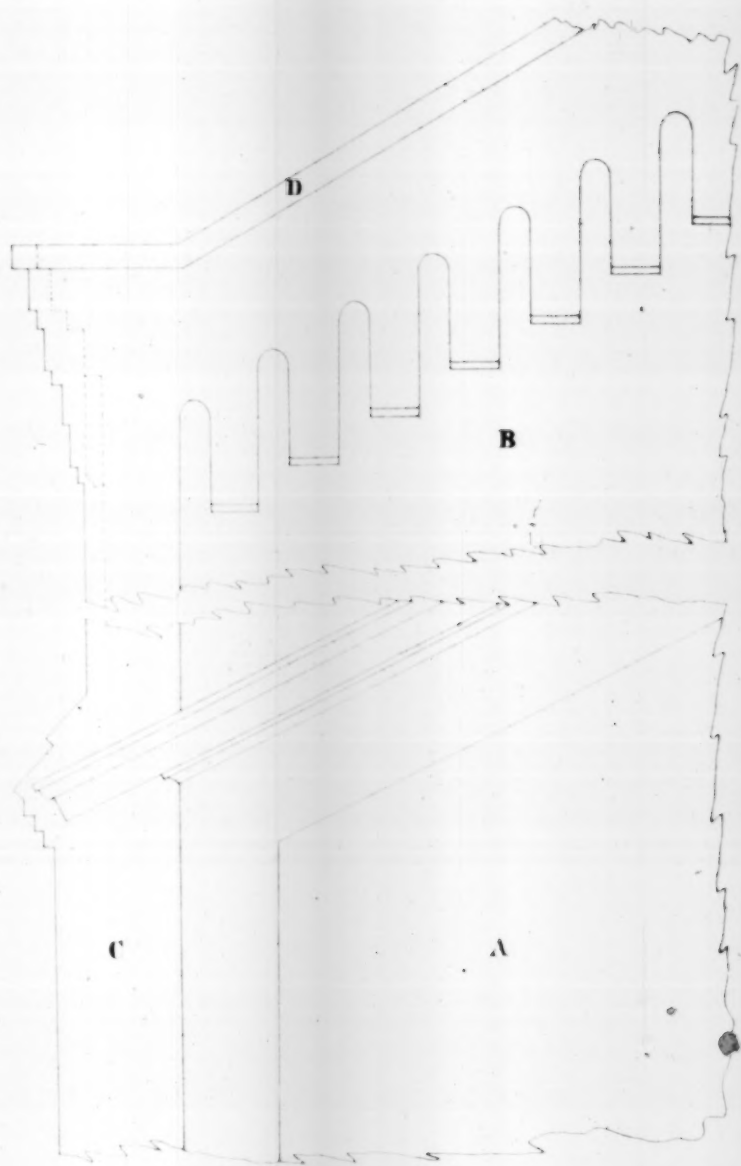


Fig. 31.

NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATION



**Fig. 32.**

27

THE NEW YORK  
PUBLIC LIBRARY  
ASTOR LENOX TILDEN FOUNDATION  
1215 6TH AVENUE  
NEW YORK 17, N.Y.



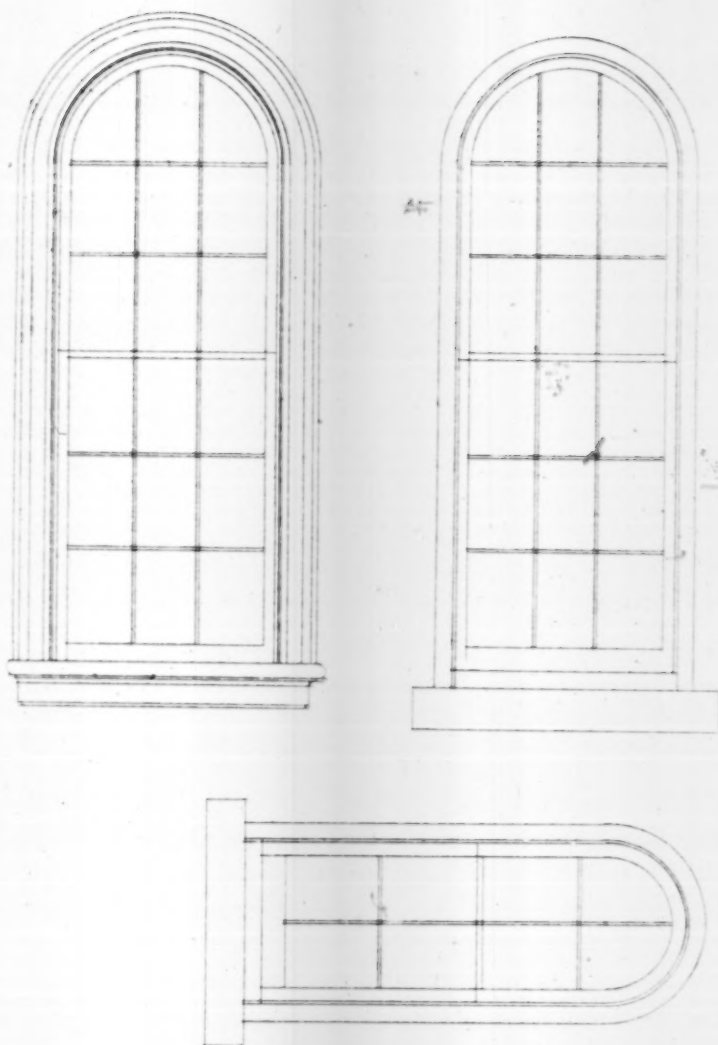


Fig. 38.

1870  
JAN 1 1871  
JAN 1 1871  
JAN 1 1871

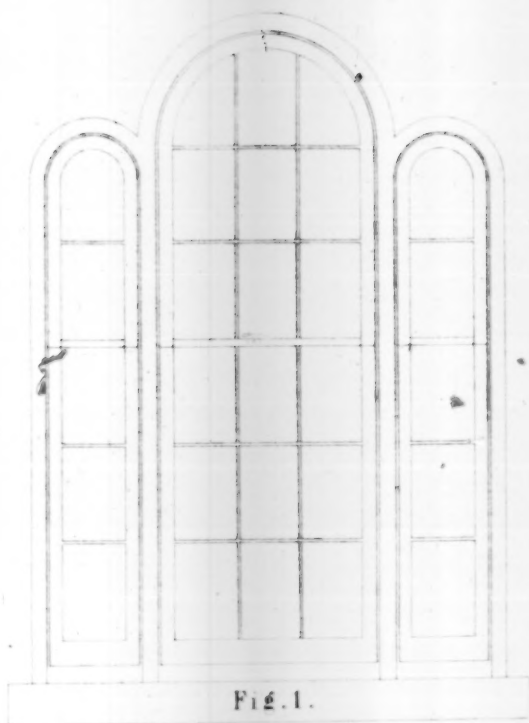


Fig. 1.

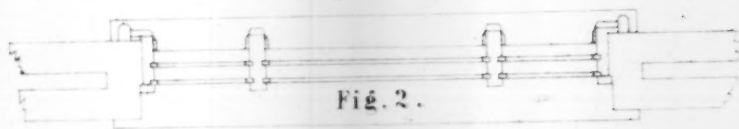


Fig. 2.

Fig. 34.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

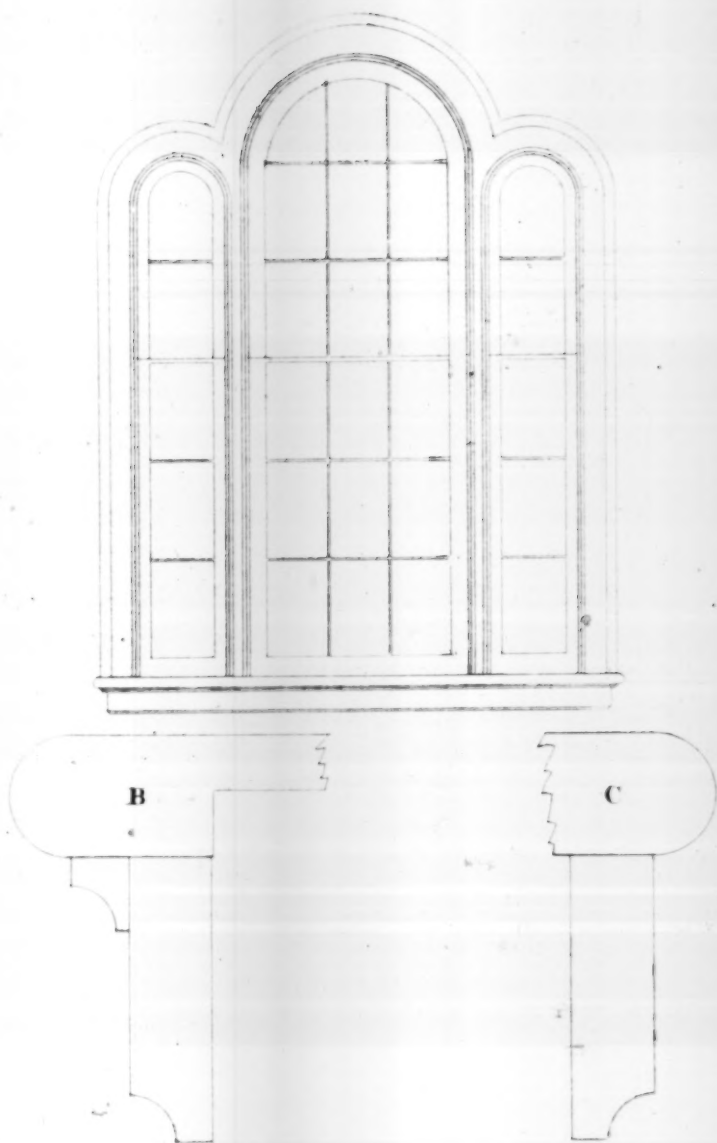


Fig. 35.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



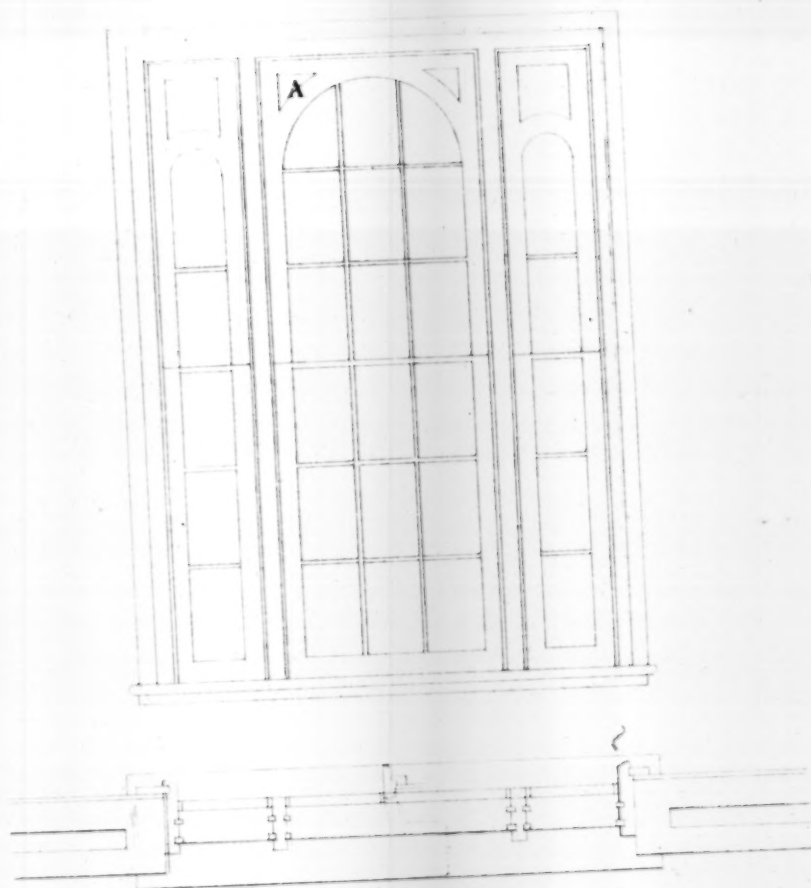


Fig. 36.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX  
TILDEN FOUNDATION

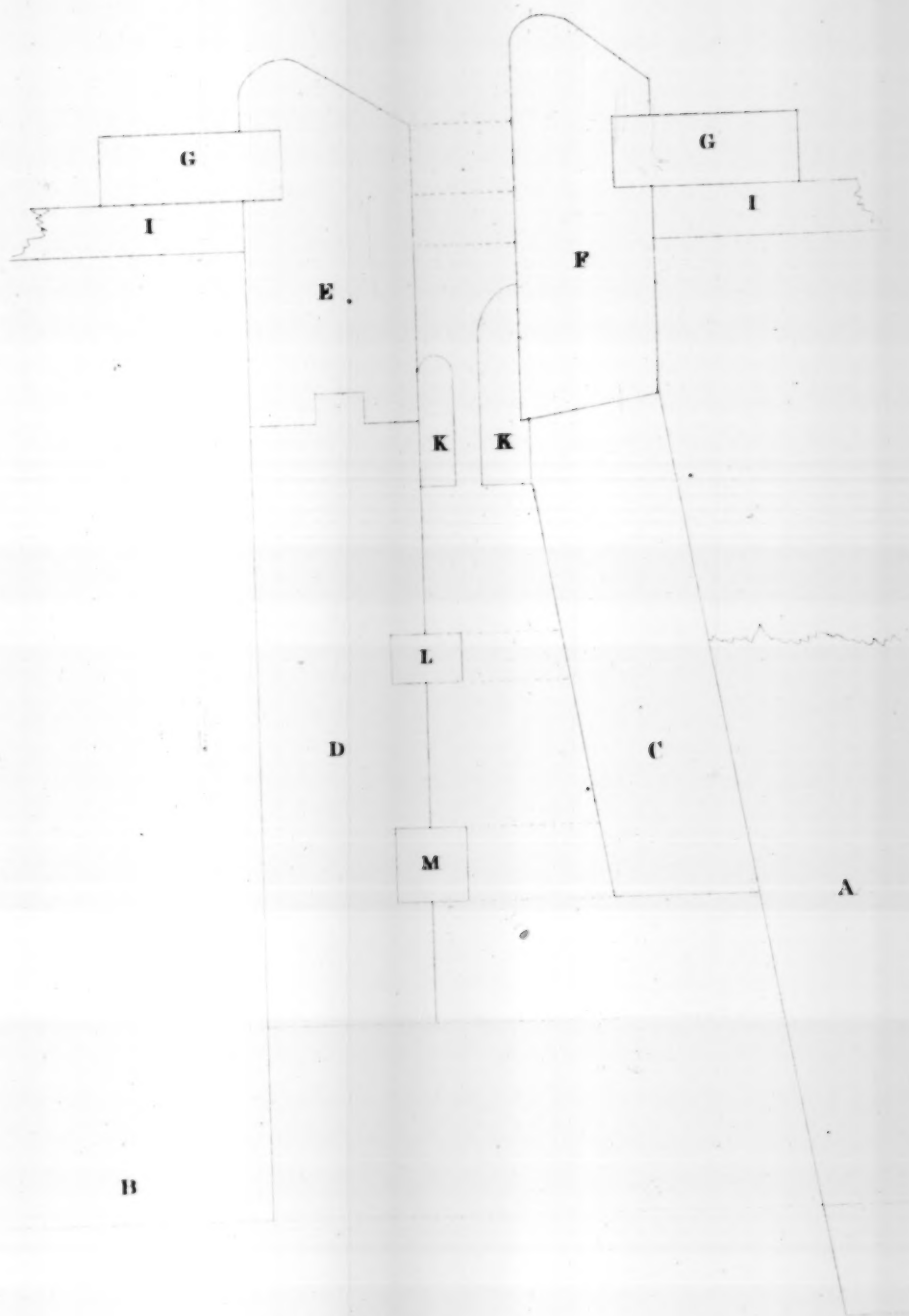


Fig.37.

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FURNITURE  
ALL THE  
FURNITURE

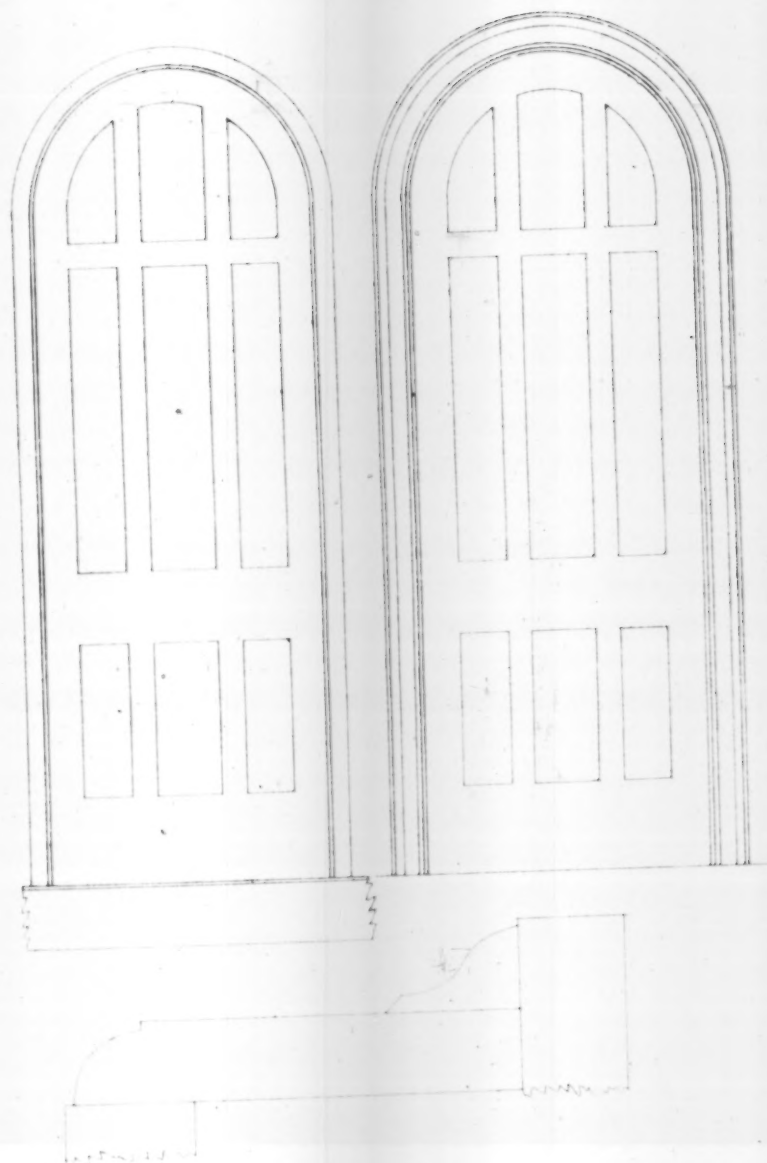


Fig. 38.





DESIGN N<sup>O</sup> IX.



Fig. 39.

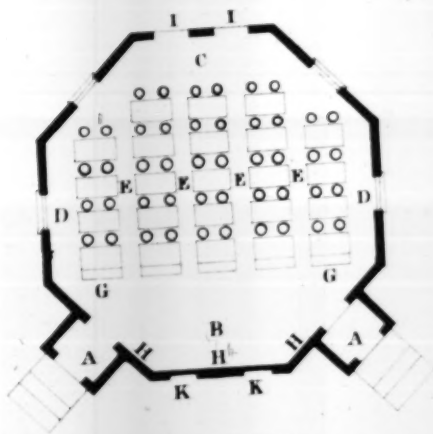


Fig. 40.

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J. W. H. H. H.  
J. W. H. H. H.

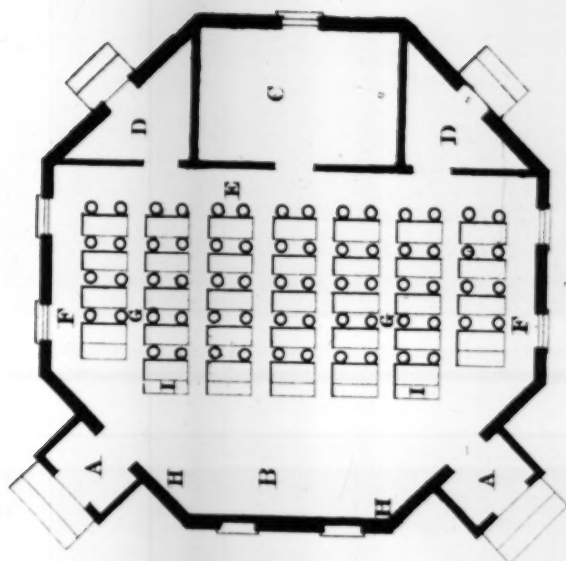


Fig. 41.

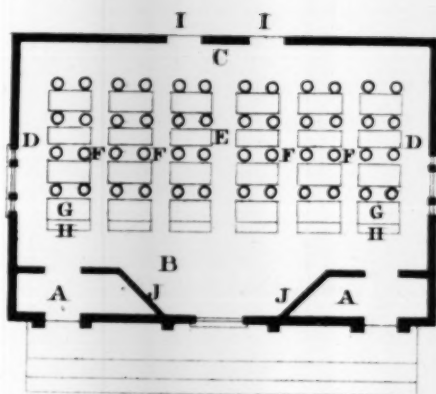


Fig. 43.



DESIGN No. 2.



FIG. 12.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



DESIGN NO. XX.

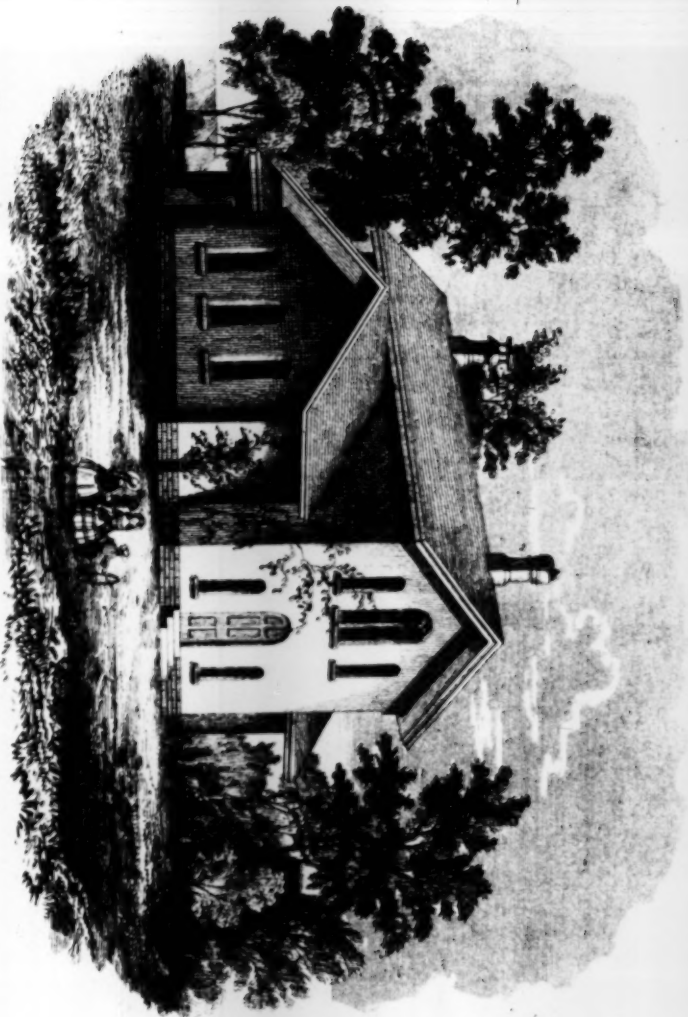
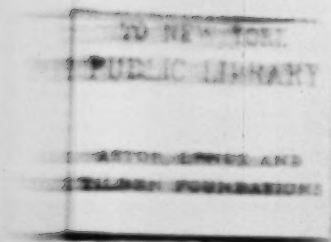


FIG. 11.

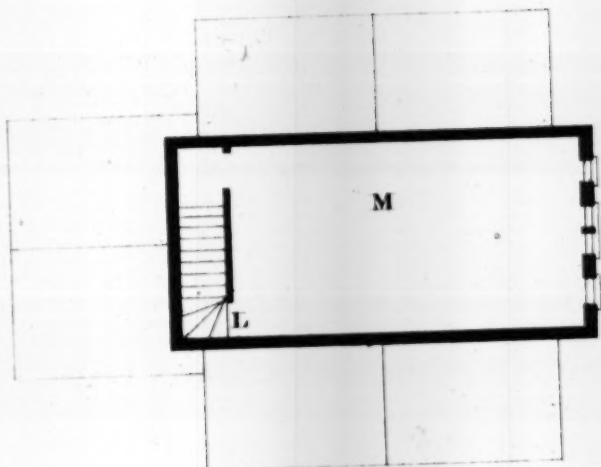


DESIGN N<sup>o</sup> XI.

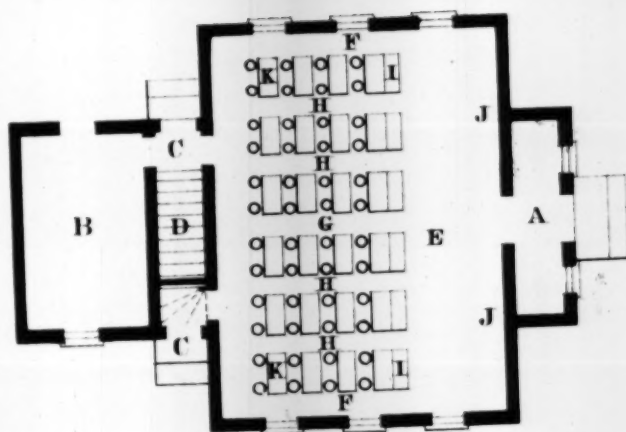


First Floor.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



Second Floor.



First Floor.

Fig. 45.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



DESIGN No. 11.

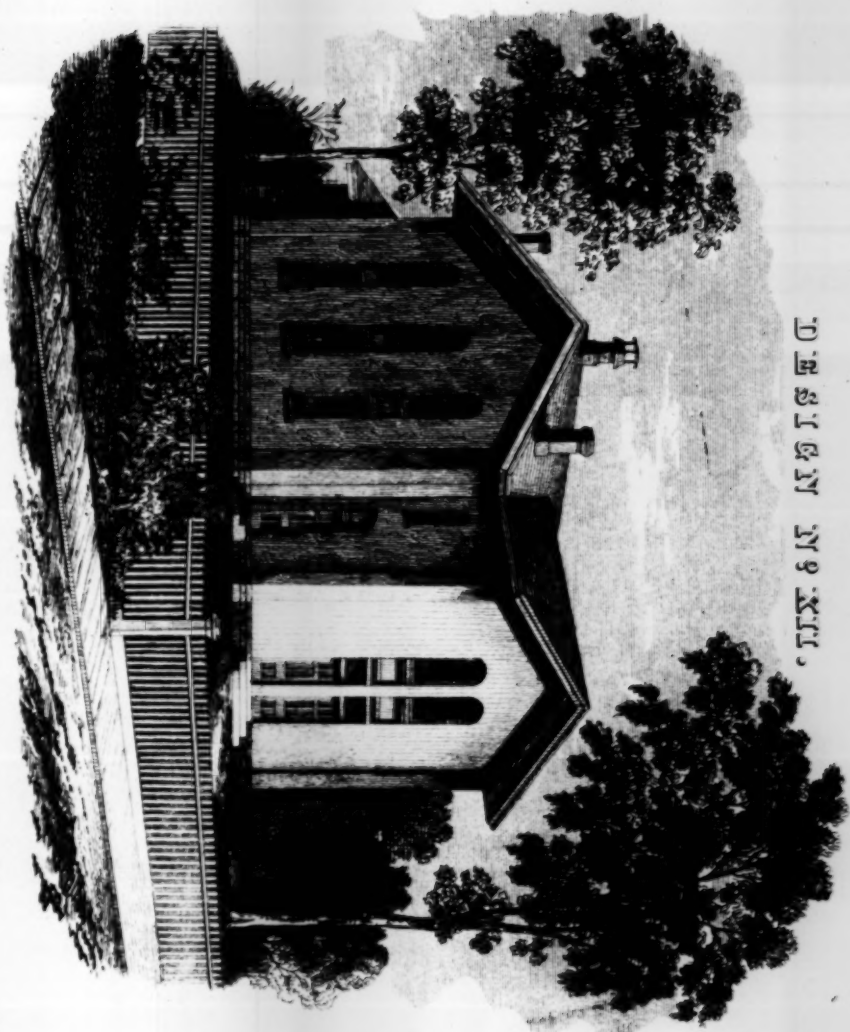
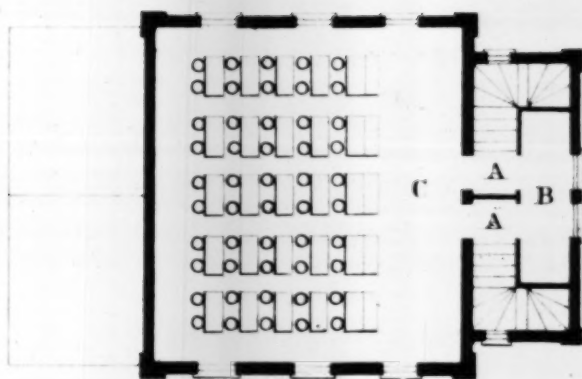


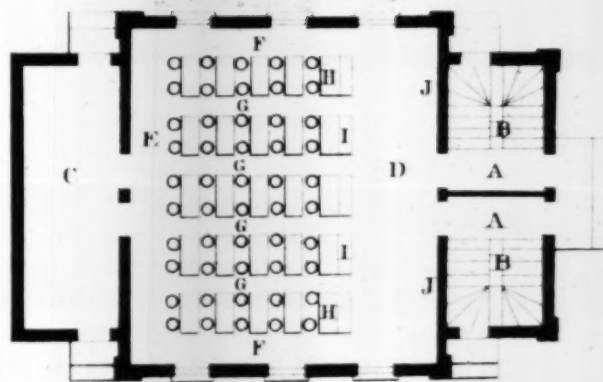
FIG. 16.

TO NEW YORK  
PUBLIC LIBRARY

ASTOR, LENOX AND  
TILDEN FOUNDATIONS



Second Floor.



First Floor.

Fig. 47.

TO NEW YORK  
PUBLIC LIBRARY

ASTOR, LENOX AND  
TILDEN FOUNDATIONS

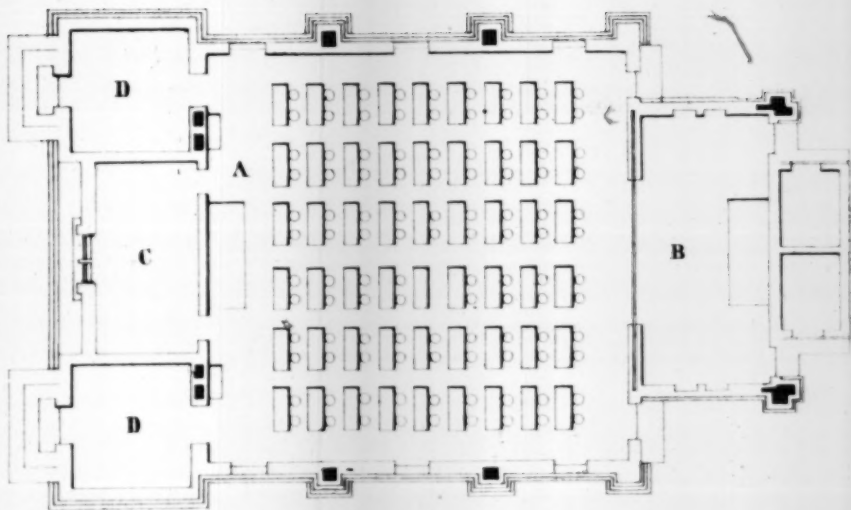


Fig. 66.

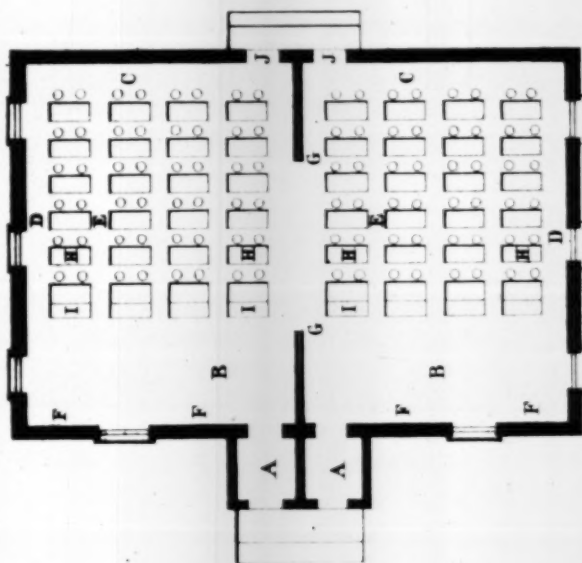
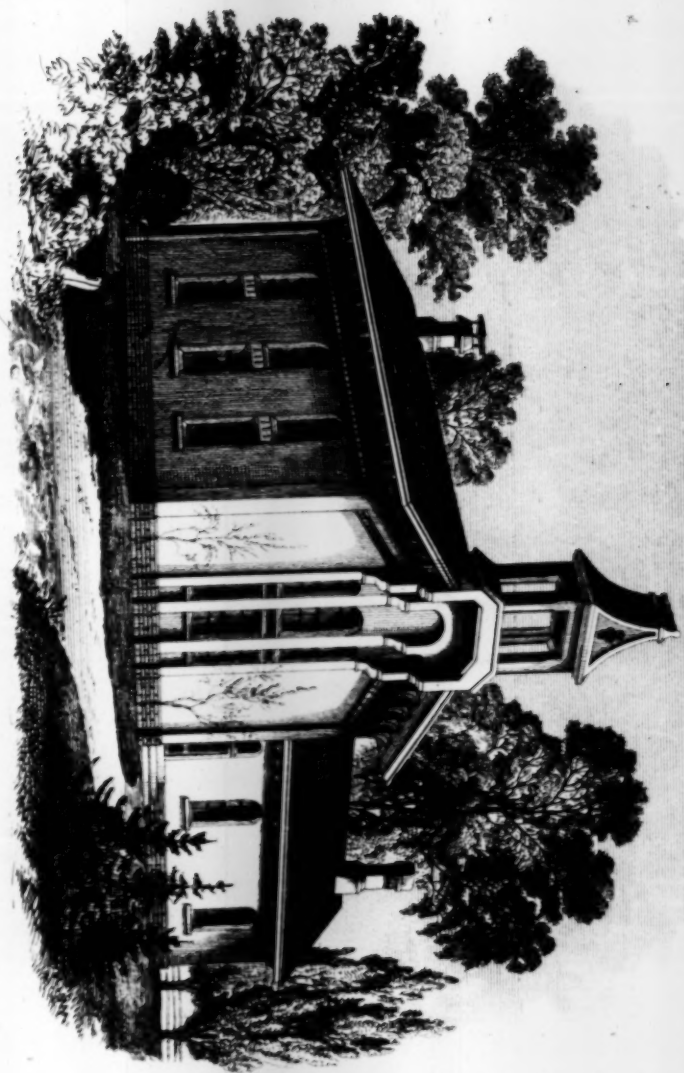


Fig. 48.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

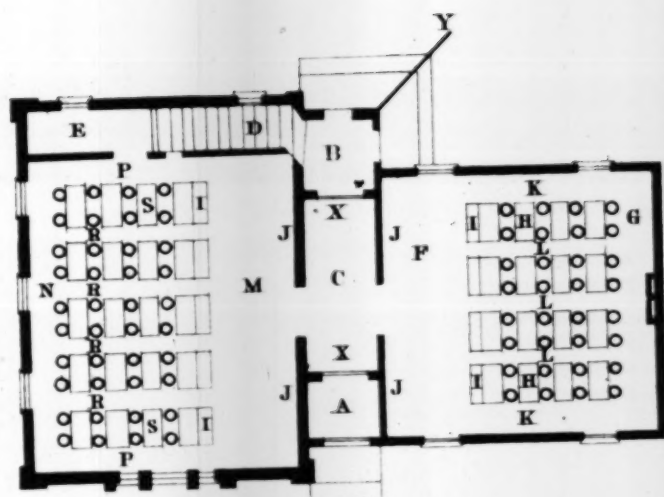




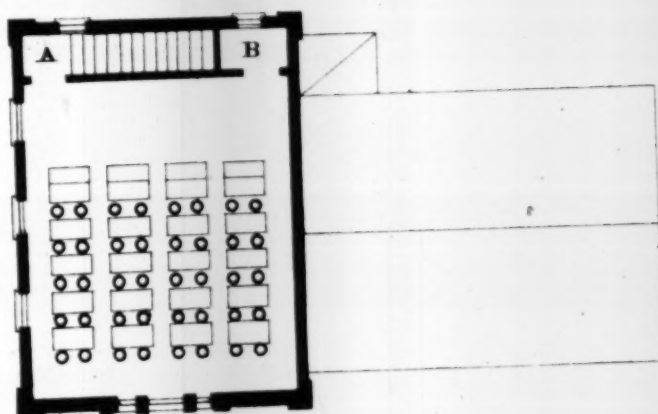
THE NEW SCHOOL

TO NEW YORK  
PUBLIC LIBRARY

ASTOR, LENOX AND  
TILDEN FOUNDATIONS



First Floor



Second Floor.

Fig. 50.

TO NEW YORK  
PUBLIC LIBRARY

ASTOR, LENOX AND  
TILDEN FOUNDATIONS

DESIGN No. XLV.

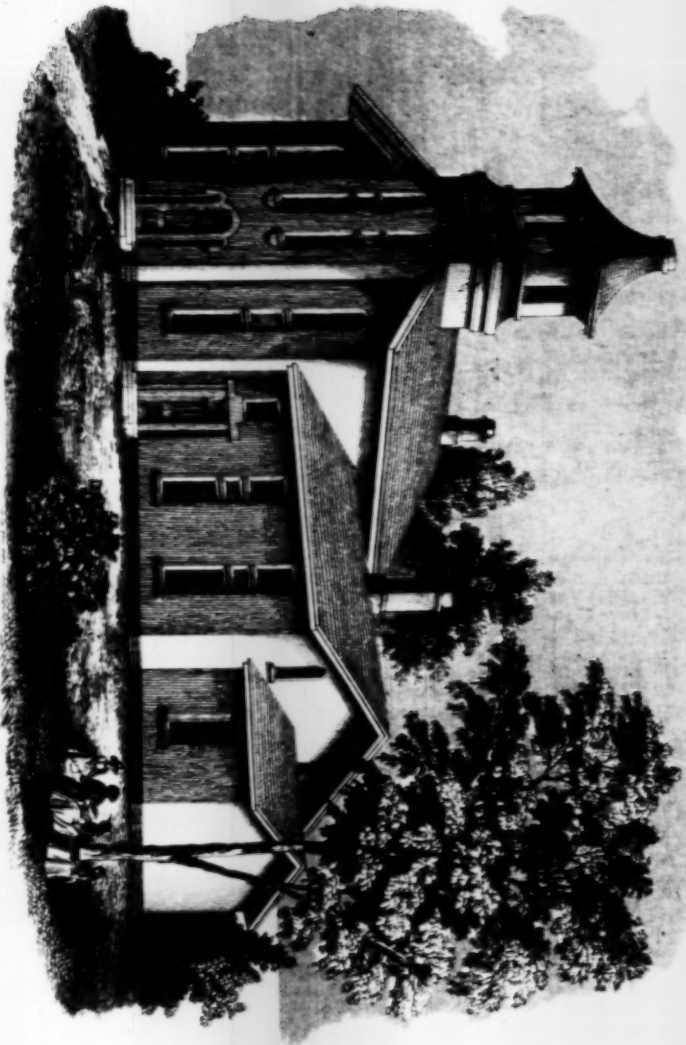
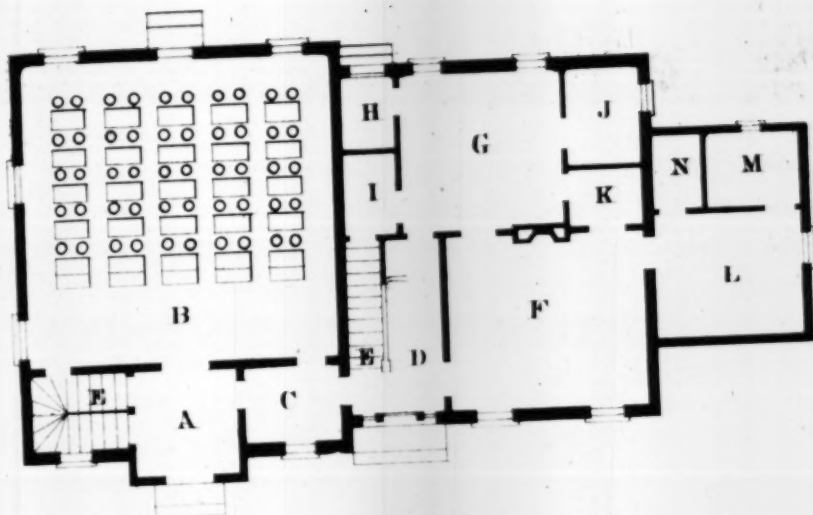


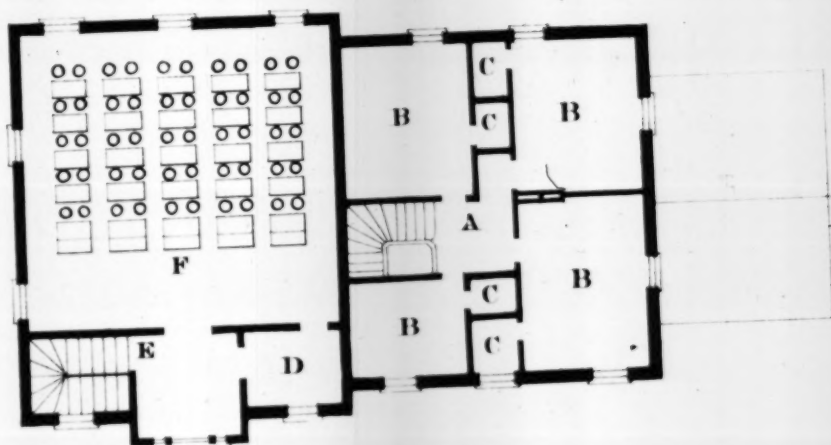
Fig. 51.

TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS





First Floor.

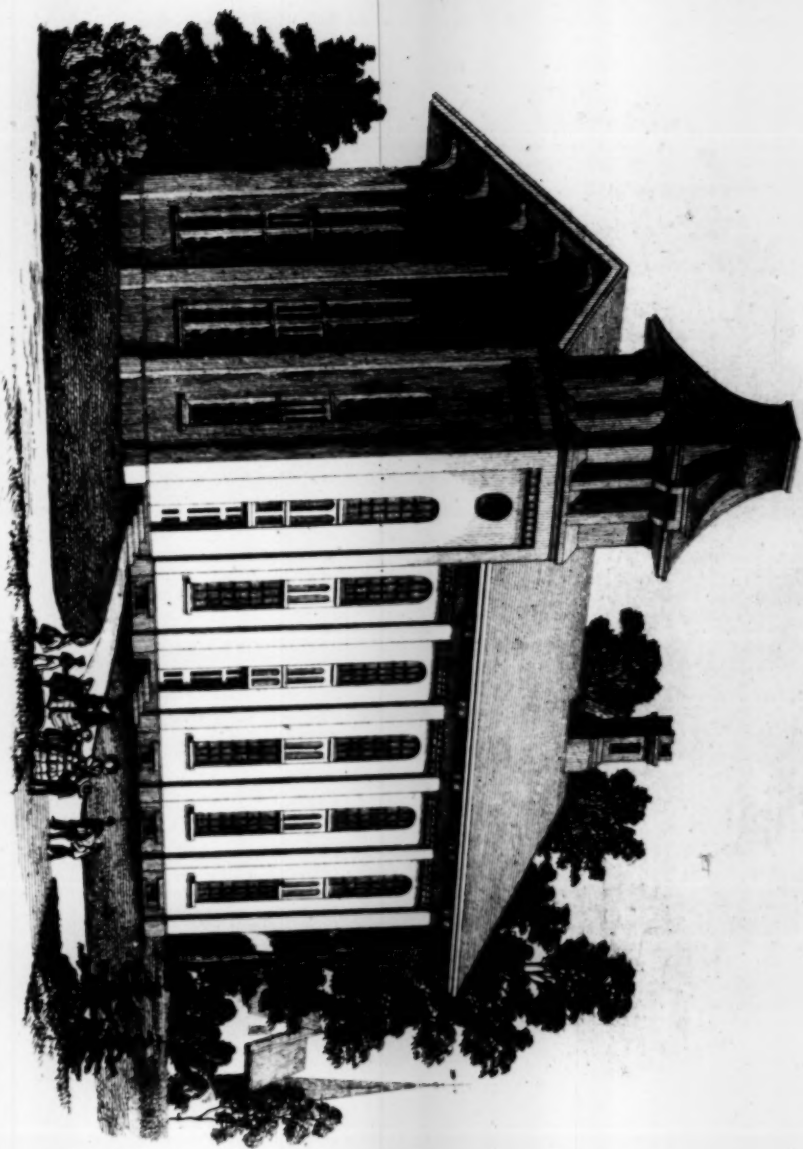


Second Floor.

Fig. 52.

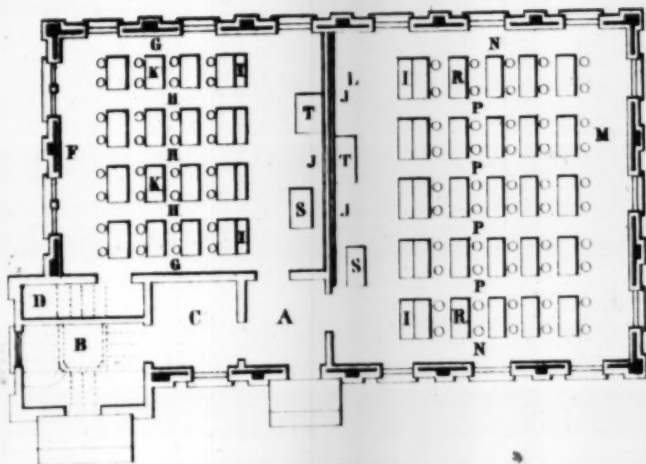
TO NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS

DESIGN N. 9.

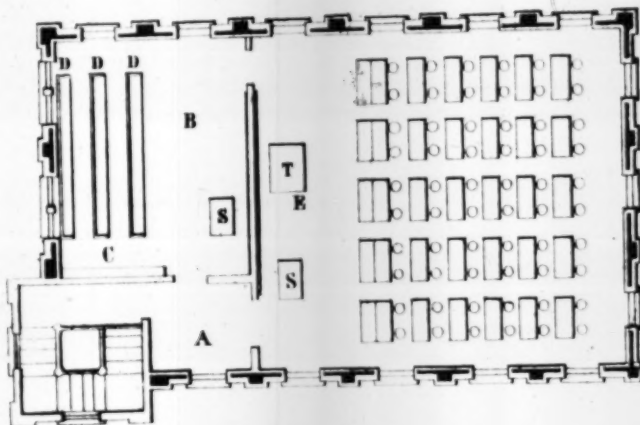


TO NEW YORK  
PUBLIC LIBRARY

ASTOR, LENOX AND  
TILDEN FOUNDATIONS



First Floor.



Second Floor.

Fig. 54.

THE NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATIONS



DESIGN N<sup>o</sup> XVI.

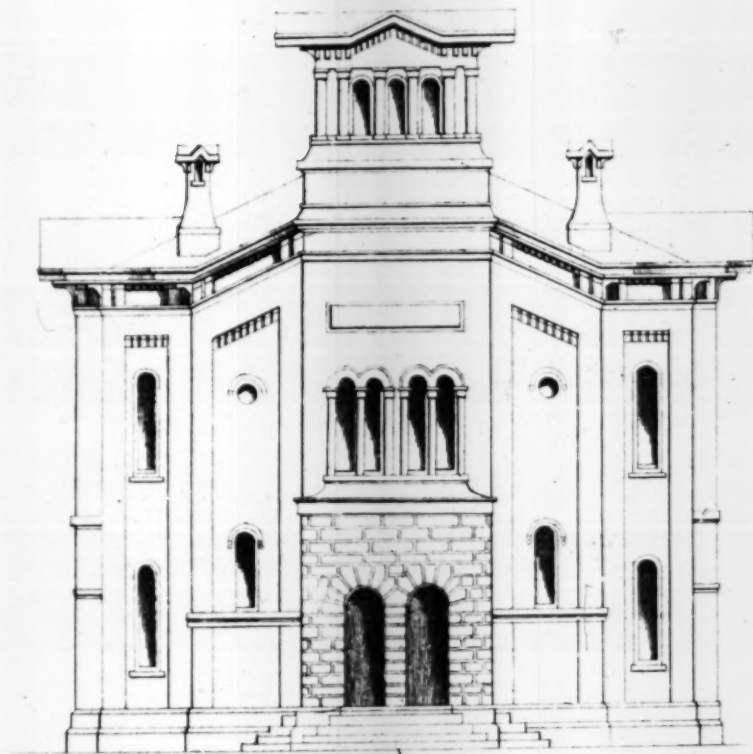
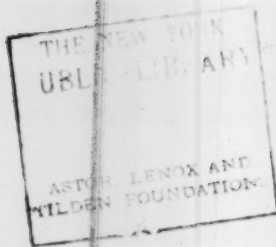


Fig. 55.

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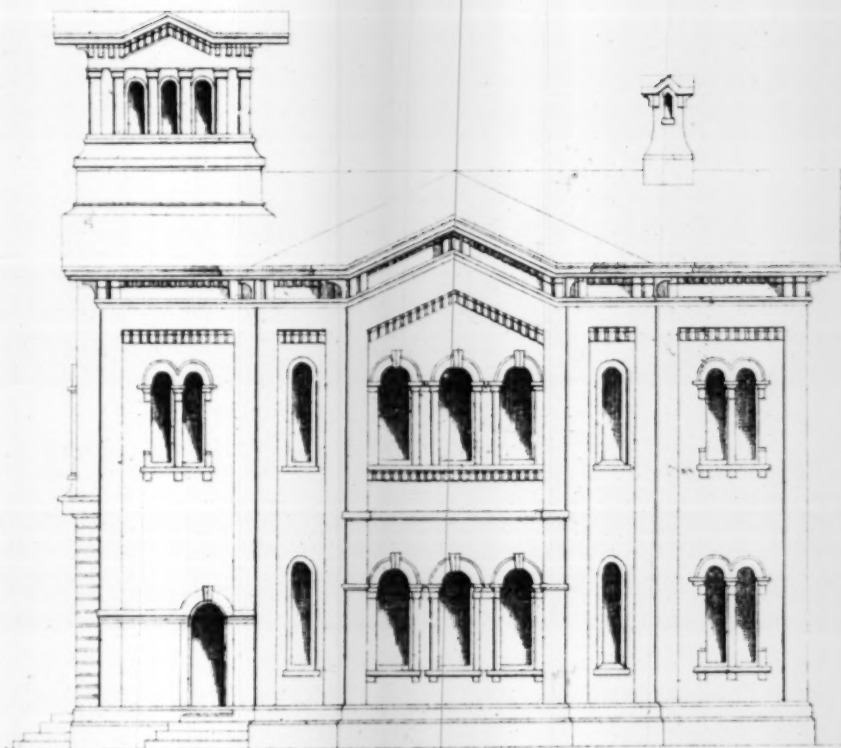
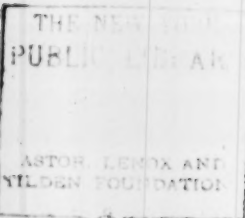
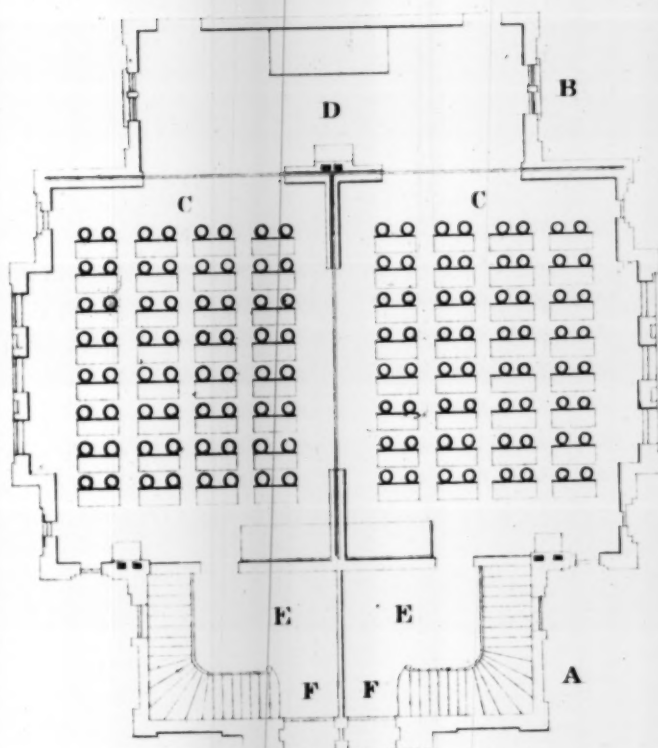


Fig. 56



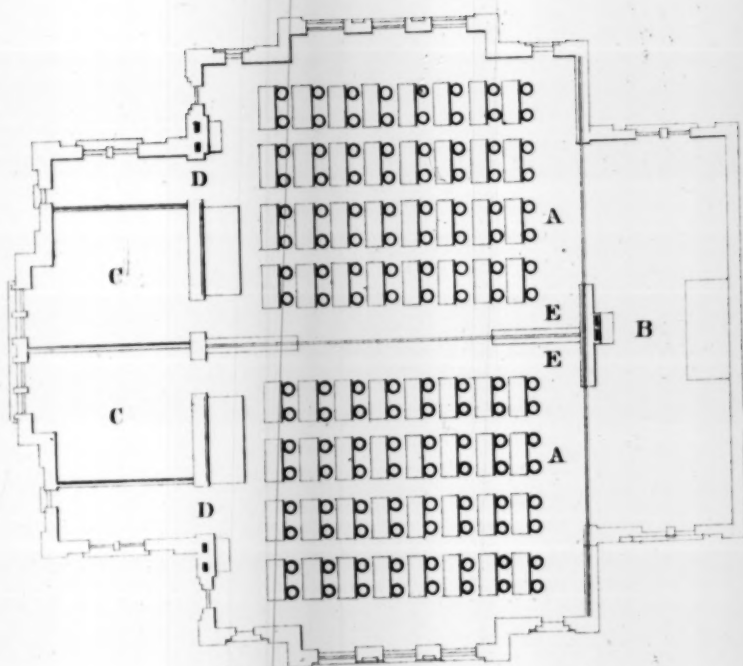


First Floor.

Fig. 57.





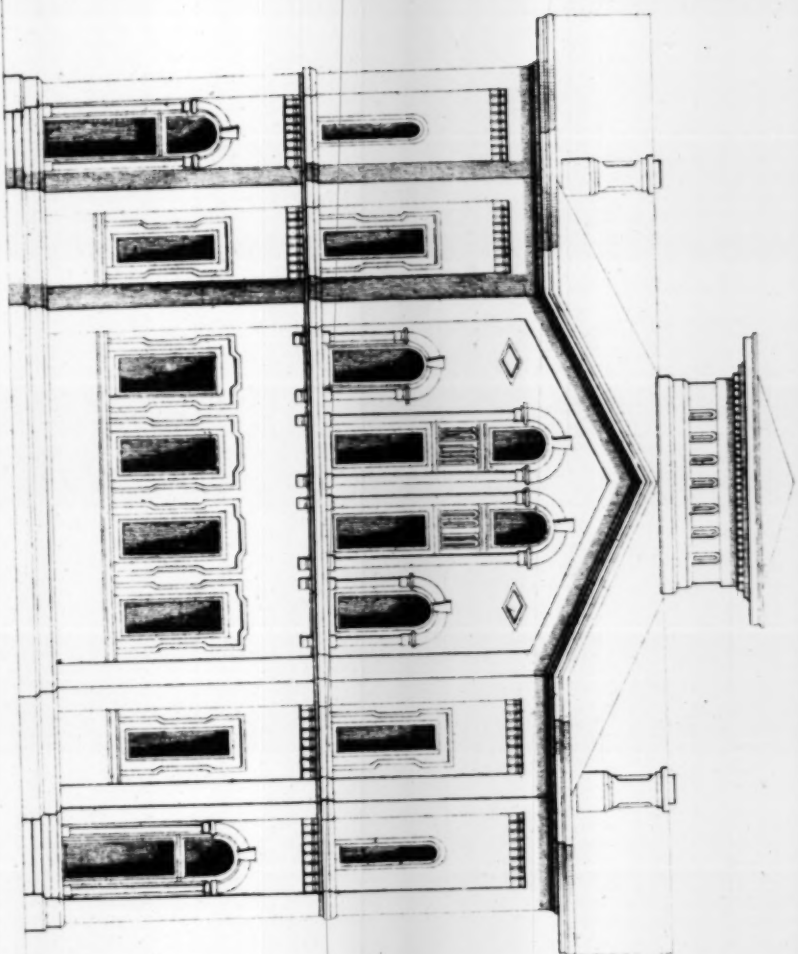


Second Floor.

Fig 58.



DESIGN N<sup>o</sup>. XVII.





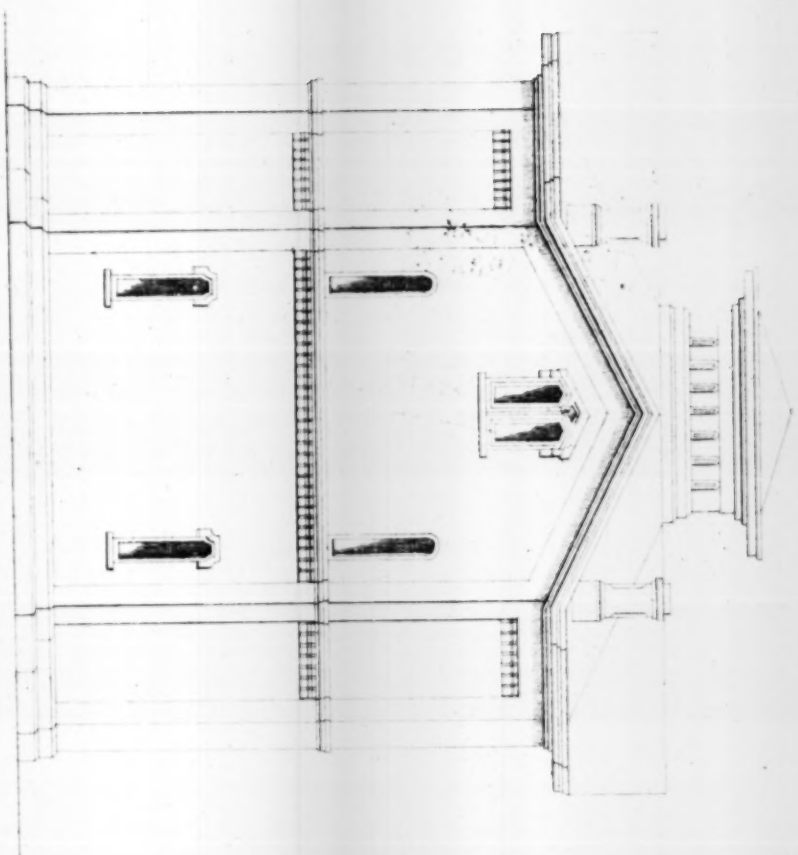
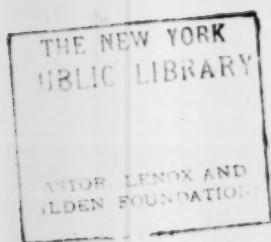
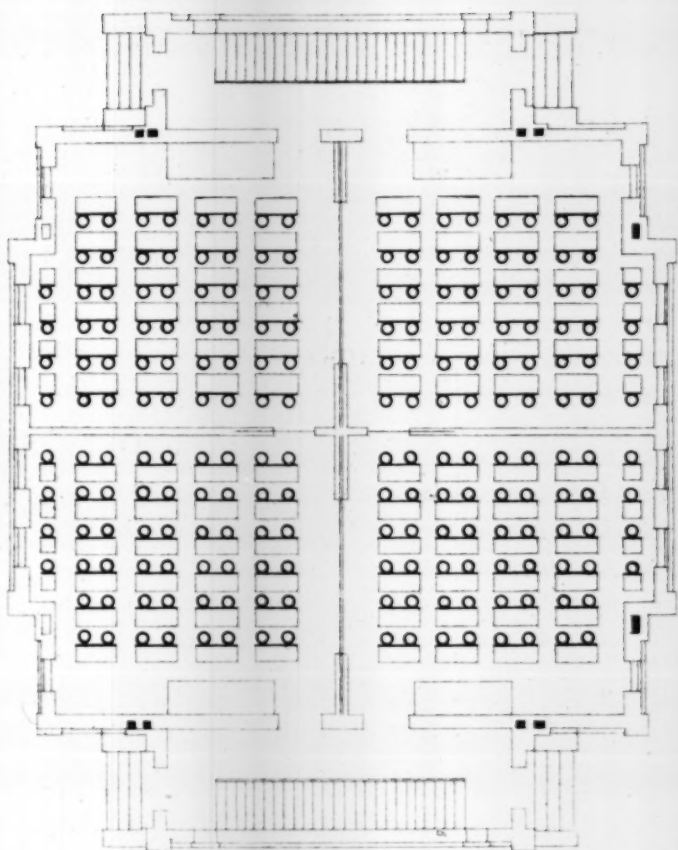


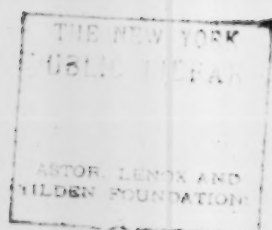
Fig. 60.

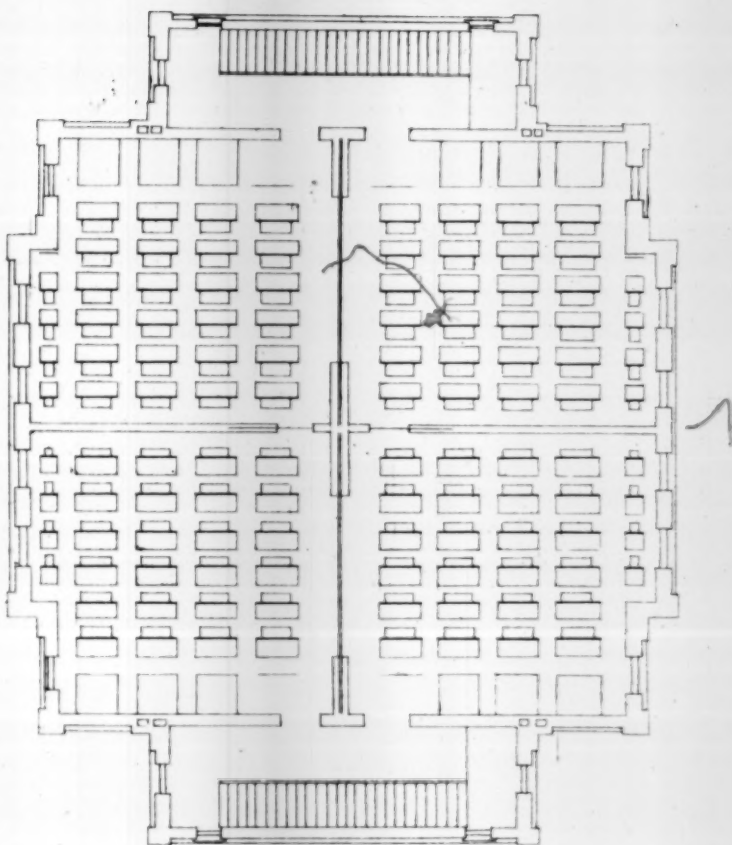






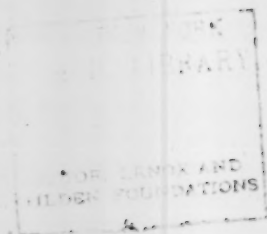
First Floor.  
Fig 61.





Second Floor.

Fig. 62.



DESIGN NO. XVII.

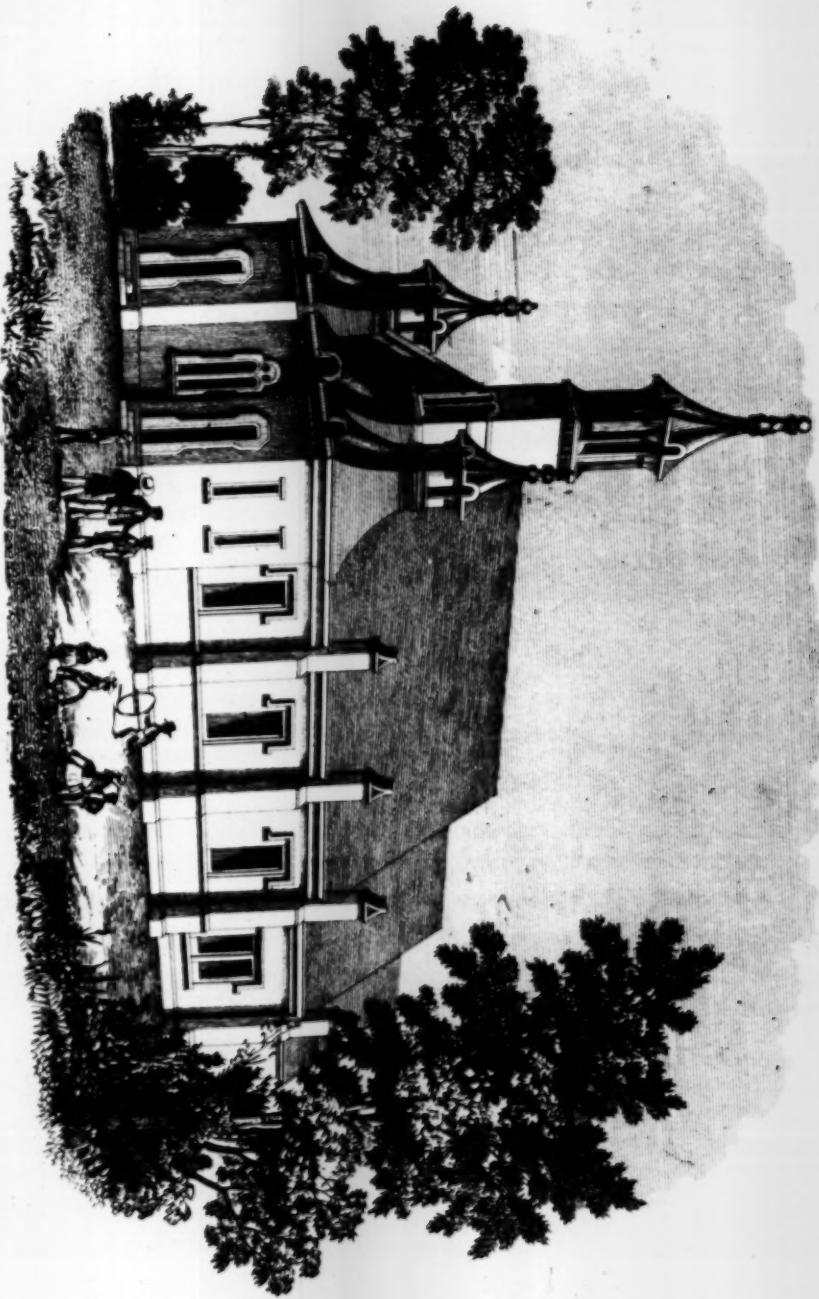


Fig. 63.

NEW YORK  
JAN 10 1891  
PUBLISHED BY  
THE NEW YORK  
PUBLIC LIBRARY  
ASTOR LENOX AND  
TILDEN FOUNDATIONS



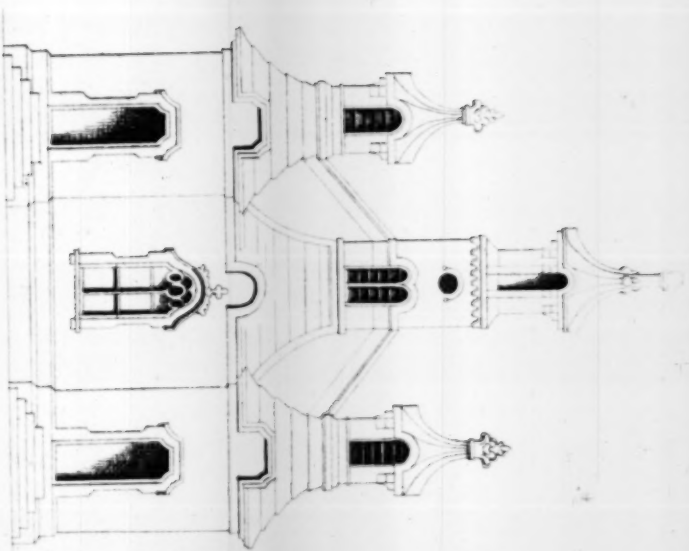


Fig. 64.

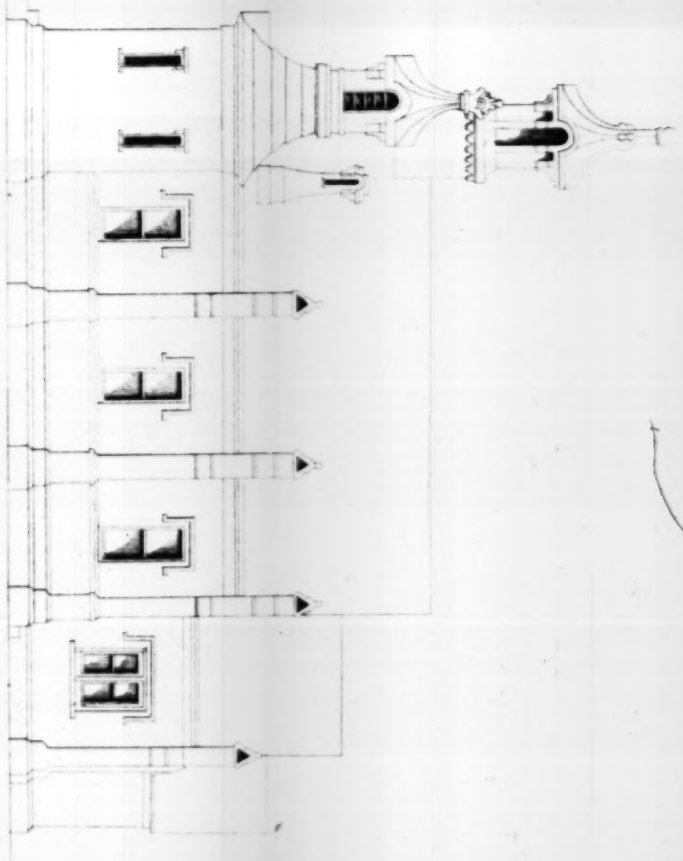


Fig. 65.

177

THE END OF THE WORLD  
AND THE BEGINNING OF THE NEW

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DESIGN NO. XIX.



Fig. 67.

THE NEW YORK  
PUBLIC LIBRARY  
ASTOR, LENOX AND  
TILDEN FOUNDATION.

THE CHURCH IN 1888.

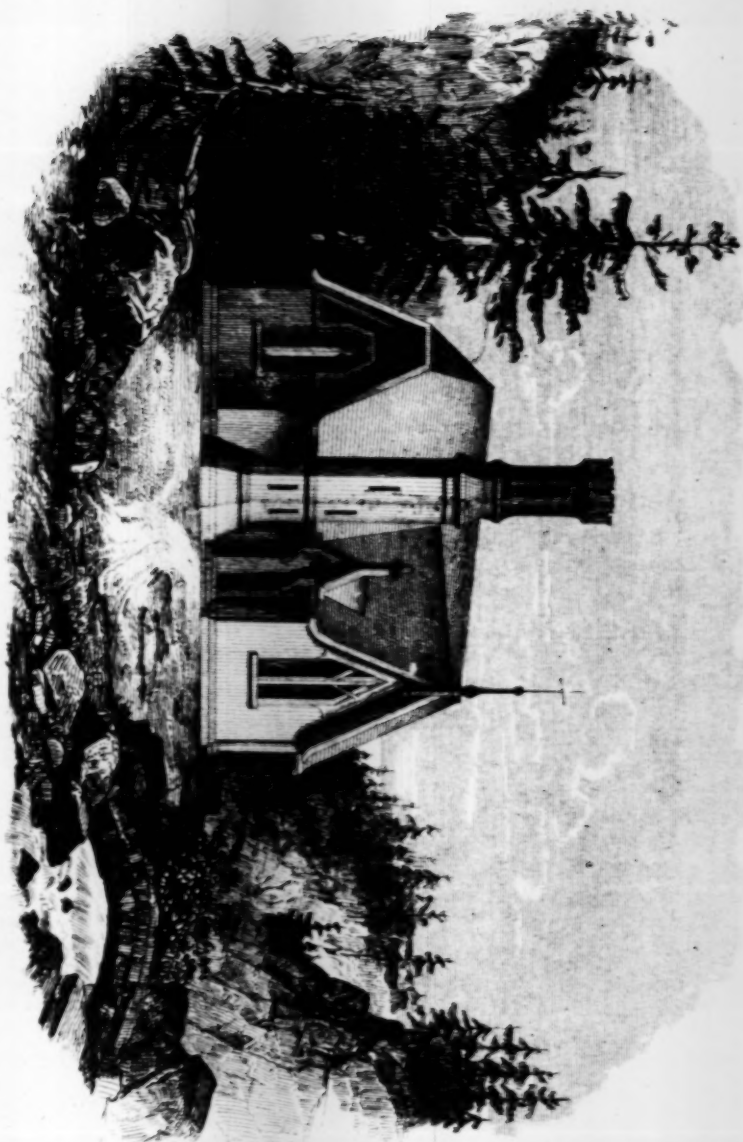
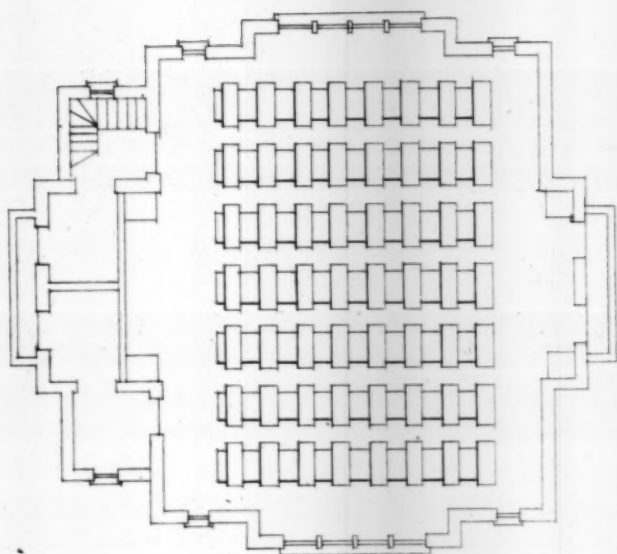


Fig. 69.

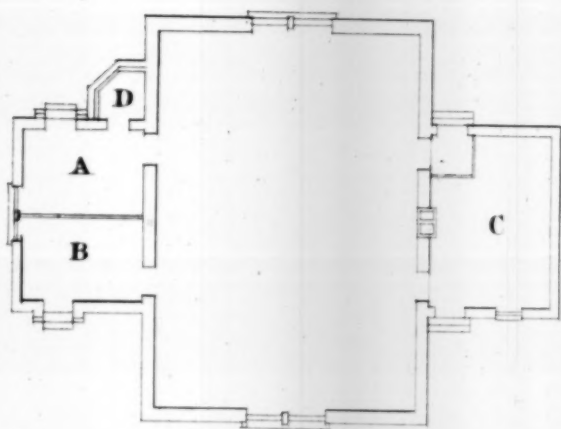
THE NEW YORK  
PUBLIC LIBRARY

ASTOR, LENOX AND  
TILDEN FOUNDATION





**Fig. 68.**



**Fig. 70.**